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VOL. XIV CHICAGO, OCTOBER, 1915 No. 4

Defining Some Acts of Unfair Competition

WHEN the Clayton Anti-Trust Act and the Federal Trade Commission Act went into effect a great deal of curiosity was felt as to their effect upon the methods of certain industries which the Sherman law had been unable to reach. But it became evident at once that these acts in themselves would decide nothing, since they failed to define the acts of unfair competition which they prohibited. The first court decisions under the new acts were therefore bound to be interesting.

The precise names of the parties involved in the first case would signify nothing to telephone men. Let it suffice to say that the defendant was a large corporation engaged in the manufacture and sale of a store appliance. This company, while not a monopoly, enjoyed practically a control of the business in its line, being its largest producer. We will assume that it handled over fifty per cent of the total business in its field; for the proportion makes a difference in the application of the decision.

Here are the court's definitions of some of the acts which constitute unfair competition:

1. Employing spies to get information regarding competitors' business by taking employment in the latters' factories, shops or offices.

2. Price-cutting below cost of production and discrimination in prices for the purpose of harming a competitor.

3. Bribing, hiring or employing architects, fire marshals, insurance representatives or municipal officers or employes to use their influence in promoting the sale of its own products or in preventing the sale of competitors' products.

4. Getting or trying to get cancellation of orders taken or of sales made by competitors or interfering in any way with contracts of competitors. The defendant company had, according to the complaint, what it called its "knockout squad," a force of special salesmen whose duty it was to cause cancellation of competitors' contracts.

5. Making false representations to customers, real or prospective, of competitors, concerning the standing or business methods of the competitors, with the intent to injure them in their business.

6. Bringing or threatening suit against competitors and their customers, real or prospective, on the assertion, known to be false or not believed in good faith to be well founded, that the products of competitors are an infringement of patent rights.

7. Agreeing to indemnify customers, real or prospective, of competitors against loss if they cancel contracts with competitors.

8. Inducing or hiring draymen, railroad employes or other persons to obtain from shipments made by competitors or from other sources, the names and addresses of their customers; except that salesmen in reporting prospective customers on whom they have called, or employes engaged to make canvasses for the purpose of ascertaining the names and addresses of prospective customers, may report the name of the appliance owned by the prospect if the purpose is not to injure the competitor.

9. Inducing or hiring salesmen, agents or other employes of competitors to leave their employment to enter that of the defendant company; except that such change may be made if without inducement from the defendant company.

Now, this was not, of course, a telephone case; yet the injunctions enumerated will ring familiarly on the ear of many an old-time telephone man. They cover, indeed, a good many of the very abuses with which telephone history is replete.

The prohibition of some of these acts appears to challenge some of the traditional privileges of business—particularly the fourth, seventh, eighth and ninth. But it must be kept in mind that the defendant in the case which brought out these prohibitions controlled the big end of the business. Presumably some of them would not apply against a smaller company.

Telephone men, in spite of the noise they have always made about unfair conpetitive methods, have seldom resorted to the courts in cases of this kind. Possibly they felt that existing laws would not support their claims. The Clayton act and the Federal Trade Commission act seem to promise future relief. With the decision quoted above already available, and more unquestionably on the way, we hope telephone men who are harassed by unfair competitors will feel encouraged to enter the courts. We await with interest the first action of this kind.

Take a Trip to California

CALIFORNIA has always been a pretty good telephone state. It has 168 telephones for every thousand of population (Iowa leading with 171), and in the last census report it ranked first for telephone messages per capita—282 for the year as against 136 for New York and 40 for North Carolina.

Without analysis we generally regard California as a good Independent state. But the census report says that out of 434,002 telephones the Bell system has 323,145, giving the Independents but 25.5 per cent of the business in the state. California needs attention.

The Independent Telephone Association of America is going to California October 21, and every Independent telephone man is invited to go along. The charge made for the trip includes every expense, and is very reasonable because of the buying power of the organization —a demonstration of the benefits of association. The trip is made easier, and its attractions greater, than has ever come within the experience of telephone men.

Some people go to California every year. To most of us, however, it is the event of a lifetime. We look to the Golden State as the Mohammedan looks to Mecca—the objective point toward which, some day, we shall travel—some day when we can afford it and have enough leisure. For it is ordinarily a pleasure trip, pure and simple; and a busy man finds it hard to dig up a good excuse for such a long, expensive junket. But we all intend to go some time.

This month is that time. Not only is the expense reduced, but even the excuse is furnished. This time it is a business trip with educational trimmings and a foundation of pure pleasure. You can even persuade yourself it is a duty.

The association has worked out the money and time-saving system, and needs Independent telephone men to take advantage of it. The two fairs offer a predigested education. The regular convention sessions of the association, and those of the California State Association, which will be held contemporaneously, will view the Independent cause from a new angle—one which the broader-minded Independent operators will regret missing. And the local situation should be absorbingly interesting to any but the self-centered operator who sees no farther than his own exchange.

The Independent telephone operator should need no argument for the California trip this month. He need only make up his mind to go.

Shade Trees as Obstructions to Progress

ASK some telephone men to give a brief definition of a shade tree and they would reply in chorus, "an unmitigated nuisance," and hum a snatch of that ballad of the last decade entitled "Always in the Way." That being the viewpoint (and, we are forced to admit, one of some justice) it is amazing how much some people, who are not telephone men, think of

their shade trees. Some few benighted individuals even go so far as to prefer the shade tree to the telephone, if forced to make a choice between the two.

We once heard Dr. Steinmetz, the world's greatest electrical engineer, express a fond hope that some day ALL the water of Niagara would be used to turn turbines instead of wasting itself falling over a rock. Sensible idea of the doctor's, very. And if he were interested in telephone construction and maintenance work he would doubtless advocate that all the shade trees be torn down, or split in half, to give the wires a chance.

But for some occult reason the shade tree, far from becoming passe, seems actually to be gaining in favor. People have been known to set utterly ridiculous values on one or two sticks of live timber growing in front of the house, and to raise the very deuce if an industrious telephone man lopped off a limb to give breathing space to a wire. The telephone man may think the tree owner is unreasonable, but then the tree owner thinks the telephone man is worse than that. So there you are. And the telephone company, generally speaking, cannot afford to antagonize the tree owner; while the latter, if he is real mad, don't give a whoop whether he antagonizes the company or not.

You see, it takes about as long to grow a good shade tree as it does to grow a man—or longer. But you can kill the tree, or spoil its beauty in a few minutes—and without any of the penalties that attach to spoiling a man. So obviously the tree needs protecting; and its owner assumes the job. Perhaps he has grown up with it, and remembers when his father planted it. At any rate, he isn't going to let it be massacred just to make it easier to run a pair of wires. And you can't blame him, either.

Now proper trimming does not hurt a tree any more than a haircut and shave hurts a telephone man. In fact, the owners of fine trees generally pay good money to have them trimmed once a year or so. The right of way man, if he is to keep the department of public relations from being a joke, must be an expert tree trimmer, and able to convince the tree owner of his skill.

Trimming trees for the telephone company is just like a lot of other things in this world. If you go at it defiantly or arrogantly, because you have the power, you may get your wires cleared; but you let the company in for a lot of hostility and trouble that lasts for years and years. Those trees may obstruct your progress for a generation. And if you go at it in a friendly, considerate, helpful way, with a little pleasant discussion beforehand and an eye to the preservation and improvement of beauty and usefulness, you get your wires cleared and the gratitude of the community.

Our readers being an intelligent people, we need not ask which is the better system. The principle, indeed, is the only one that can hope to succeed in dealing with the people. It should be extended from the trimming of private trees to the trimming of trees along the country highways; and from that to every other point where the public's viewpoint may differ from yours. You work for the public; it is your boss.

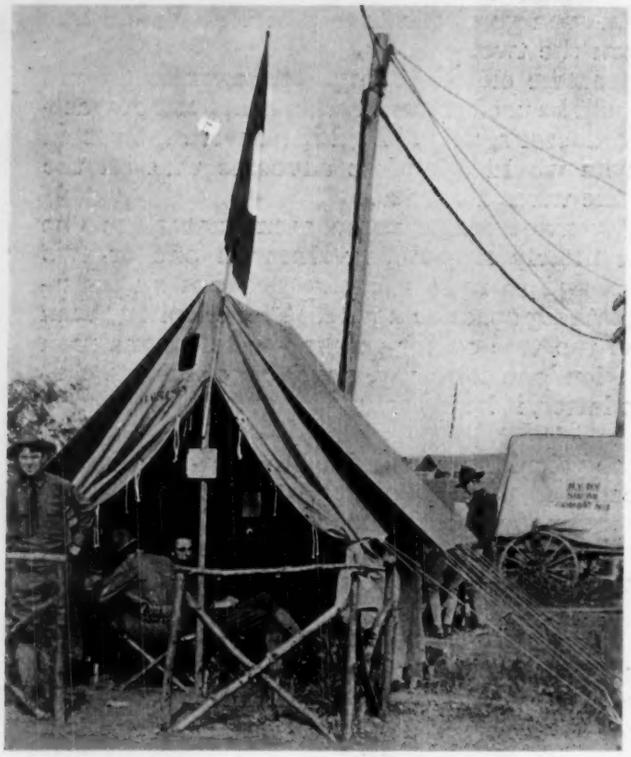
The Mystery of Decatur

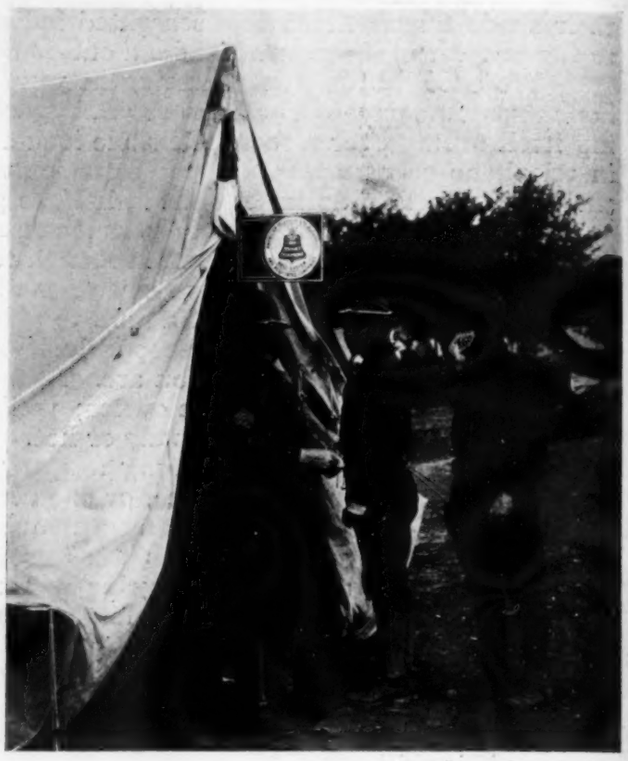
A LETTER from E. B. Fisher on another page reports rumors of a merger deal at Decatur, Illinois. Decatur is in Central Union territory, and Central Union is in receivers' hands. One of the receivers refused to discuss the subject, but his refusal implied the authenticity of the story. Chicago counsel for Central Union's minority stockholders knew nothing of such a deal; no petition has yet been presented.

Such a merger could not go through without court sanction. But it does not necessarily follow that the court would weigh the legal aspect of the deal before issuing the order, unless proper and responsible protest were made.

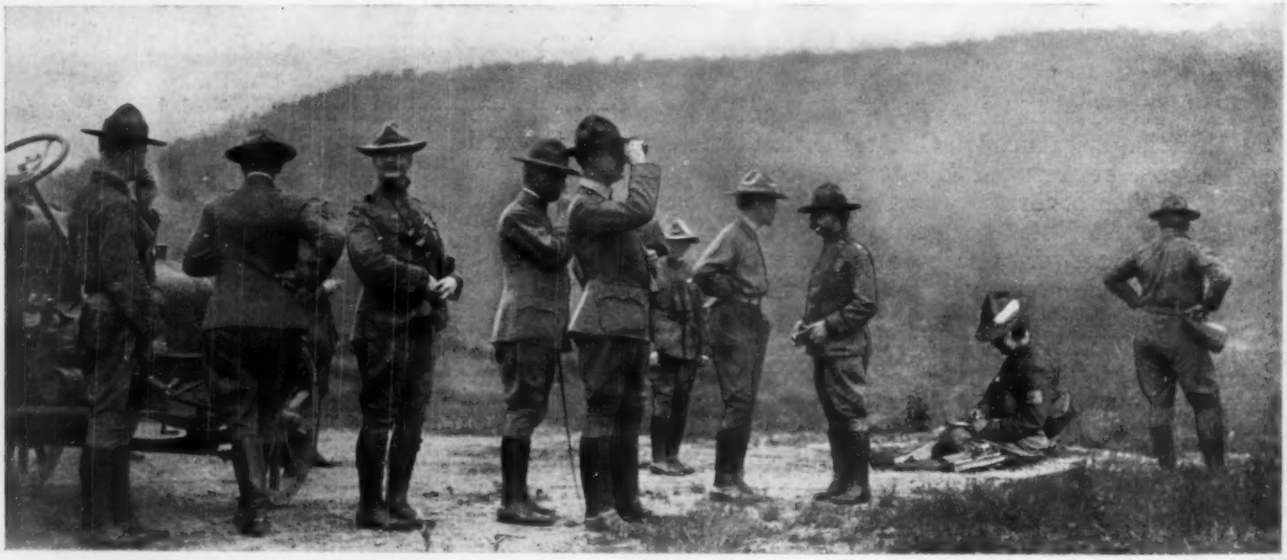
Strange and weird as it may seem to Mr. Fisher, privately we have no doubt that the Central Union Telephone Company receivers contemplate the purchase of the Decatur Independent property. The court will not protest the action itself; the Independents who object to it must do that. Perhaps they can stop it; perhaps they cannot. The minority stockholders of the Central Union protested the merger at Anderson, Ind., and took the case to the United States attorney-general. He refused to say anything, and the court granted the order.

Decatur's salvation depends on the importance of its interstate business and the date of its sale contract—if such instrument exists. Further comment we reserve until the deal emerges.





Detachments of the National Guard of New York State and of the Regular United States Army, Located Camp Whitman at Fishkill Plains and Established It as Headquarters for Their Annual Summer Maneuvers. In a Single Night a Great Khaki-Hued City Sprang Up—a City of Canvas Tents Harboring Thousands of Soldiers, Many Regulars, but the Majority Citizens From Every Walk of Life, Including Prominent Professional and Business Men Bent on Securing Military Instructions. In This City of Tents Was Every Facility for Convenience; Systems of Water Supply, Sanitation and Telephonic Communication. The Latter Was Built and Operated by the Signal Corps, Headquarters Being Located in the Center of the Camp, From Which Many Lines Radiated, Stretching in All Directions and Connecting Up Every Unit of the Camp's Force, Facilitating Its Management and Making It Possible to Attend to the Multitude of Camp Duties, Quickly and Without Effort. Every Detachment Was Completely Supplied With Modern Field Telephone Apparatus in Order to Make Inter-Communication to All Parts of the Army Accessible Constantly. Public Telephones Were Installed, Enabling Citizen Soldiers to Communicate With Their Homes and Offices and Thus Make Possible the Attendance at Camp of Many Who Couldn't Neglect Their Affairs. One of the Features of the Encampment Was a Mimic Battle Staged Between Two Divisions. One Division Was Concentrated Nearly Twelve Miles Distant, Their Approach Being Detected by a Message Received on the Wireless Antennae. Immediately the Information Was Transmitted to All Divisions of All Detachments by Means of the Field Telephones.—The Telephone Review.



STORIES IN PICTURES OF TELEPHONE PRACTICE AND PROGRESS IN ALL PARTS OF THE WORLD.

Between Delta and Grand Junction, Colorado, There Is a Stretch of Desert Covering Nearly Thirty Miles, on Which There Is No Habitation and Across Which the Road From Delta to Grand Junction Extends. An Emergency Telephone, Which Is a Weatherproof Instrument, Made by the Western Electric Company, Has Been Placed About Midway of the Desert on a Telephone Pole, at the Request of the Grand Junction Motor Club. The Service Is Paid for by the Motor Club and Has Helped Out During the Summer a Great Many Motorists Who Found Themselves in Trouble on the Desert.

Telephoning to Artillery the Result of Range Finders' Observation.—The Telephone Review.

Cable Entrance to Telephone Headquarters From Which Calls Are Received From All Outlying Posts.—The Telephone Review.

Temporary Maintenance of Cables Immediately After Being Removed From the Conduits and Before Being Boxed Up in the Plank Box.

Line of Conduit With Cable Laid. The Muslin Strips Prevent a Cement Mortar From Getting Into the Ducts.

A View at Street Intersection, Showing Cables Being Lowered Into the Split Ducts.

View at Intersection of Pentland and Tunnel Streets. P. & A. Telephone Company's Building Seen in the Foreground.

Cables With Plank Box Removed Preparatory to Being Hung Over Trench and Lowered Into Split Ducts.

Five Views Taken During the Removal of the "Hump," Pittsburgh, Pa.—Pittsburgh Industrial Development Commission.

STORIES IN PICTURES OF TELEPHONE PRACTICE AND PROGRESS IN ALL PARTS OF THE WORLD.

That Mysterious Situation at Decatur

EDITORS TELEPHONE ENGINEER: It is not the plan or purpose of the Independent Telephone Association of America or its officers to neglect in any manner the paramount issue as affecting independent telephony so cogently and forcefully presented by TELEPHONE ENGINEER in its July issue, "Force Physical Connection." As already stated, the Association has fully committed itself formally to action in this matter, has devised a program therefor, and is pushing the matter with decided encouragement on the part of independent telephone companies throughout the country. Other work along this line is in progress, and it is believed that the plan will be carried out with all the force and energy requisite. To this end all independent interests in the country are earnestly and urgently invited to co-operate, and definite, full information can be secured from the secretary of the Independent Telephone Association of America, W. S. Vivian, upon application in person or by mail at his office, or from any of the directors and officers of the Association.

But, while this is true, other matters very considerably affecting Independent interests must be given attention, and are brought through the medium of TELEPHONE ENGINEER to general consideration, especially of members of the I. T. A. of A.

At the Independent Telephone Convention, September 15 and 16, a report was current of very decided interest to the independent telephone men of the country generally, and especially to those in the middle West. It was to the effect that arrangements had been or are about to be completed by interests, undoubtedly Bell, for the purchase of the Decatur, Illinois, independent telephone plant, the price therefor being a little in excess of three hundred thousand dollars. This report was very earnestly, although quietly, discussed, and was believed to be true by those who heard it. This, notwithstanding the fact of that well-known letter of December 19, 1913, containing this paragraph:

"*Second*—Neither the American Telephone and Telegraph Company, nor any other company in the Bell system, will hereafter acquire, directly or indirectly, through purchase of its physical property, or of its securities, or otherwise, dominion or control over any other telephone company owning, controlling, or operating any exchange or line included in the Bell system or which constitutes or may constitute a link or portion of any system so operated, or which may be so operated in competition with any exchange or line included in the Bell system."

It was remembered that that notable letter contained a proviso, and what that proviso included, and it was asserted positively by those who were familiar with the facts that this rumored purchase did not come within the provisions of that "provided"; it was asserted positively by those presumably familiar with the conditions that no arrangements looking to the purchase of the Decatur plant antedated the letter of December 19, 1913; and it was further reported that no reference as to such proposed purchase had been made to the department of justice.

Now, this purchase has some very peculiar, not to say mysterious, features or possibilities which should be recounted to be fully appreciated.

Decatur, Illinois, is within the geographical limits of the Central Union Telephone Company, Bell subsidiary, now in the hands of receivers; that company has a local plant of importance and of considerable size competing with the independent plant in Decatur. The Central Union Company is currently reported to be very seriously in debt, its outstanding obligations having been stated as in excess of thirty million dollars, and chiefly owing to the American Telephone and Telegraph Company, the parent company, which caused the letter of December 19, 1913, to be written after "suggestions" from the department of justice.

Such corporation in the hands of receivers appointed by a United States Court would hardly seem to be in a financial condition to indulge in a purchase exceeding three hundred thousand dollars in amount from its own resources. Its inability to take care of its finances unaided, for many years past, is known to all familiar with its conditions and history.

It is the more difficult to conceive of the Central Union's purchase under such circumstances, because such a transaction could not well occur, or with propriety, without the sanction of the receivers, and it is hardly conceivable that receivers, acting under authority and supposedly by direction of a United States court, could act after the decision in the Oregon case, known, of course, to all United States judges, so clearly defining the status of telephone companies under the Sherman Act.

As heretofore stated, that decision forbade the American Telephone and Telegraph Company and various and sundry of its officers and other telephone officials from such action, not only in Oregon, but elsewhere, and the injunction was made perpetual.

Again, it hardly seems possible that the American Telephone and Telegraph Company, which unquestionably has the financial ability so to do, is proposing deliberately to receivers acting under authority of a United States court to ignore the Oregon Circuit Court decision. If the officers specifically named in that decision shall enter into such transactions, it is conceivable that contempt of court might be charged, and that sort of thing, with reference to United States courts, is usually considered very serious—not likely to be entered upon.

Again, it is not conceivable that any interests outside of the Bell interests would have any special occasion to buy such a property now successful, growing and fully able to continue prosperously and become still more successful. Indeed, the rumor left no doubt in the minds of those who heard it, and among them were persons who had direct financial interests in the Decatur corporation and large indirect interest in physical connection therewith, that the Bell interests were at the bottom of the scheme for the purchase.

There is no doubt that the Decatur plant is engaged in interstate commerce. Officers of corporations in other states made the assertion that they had very considerable physical connection and business with the Decatur plant, the gateway to and from the West through St. Louis and to and from the East through Terre Haute, particularly being quoted in this particular. So, if the Sherman Act and the interstate commerce laws apply to telephone business—and as to the Sherman Act the Oregon court leaves no question—this proposed purchase, if by Bell interests, is a deliberate ignoring, and, if consummated, disobedience of the law of the land, of the formal decision of the United States court, and of a promise apparently made in good faith by a responsible officer of the American Telephone and Telegraph Company. It would not seem to present any element of exception to this assertion, and for that reason becomes of prime immediate importance.

There are those in attendance at the Indiana convention who announced their financial interest in the situation and a determination to contest the sale with all possible vigor and to the courts of last resort if necessary.

It would seem that this is a case as to which all independent interests in the country are directly affected, and that it might well be made the object of general attention. It might easily become a test case, following the Oregon case and litigation, in which the exact rights of independents and the exact possibilities of competition in the telephone industry could be defined.

Indeed it would seem that if the matter be properly presented to the department of justice—and it should be so presented—the government would intervene to prevent what seems so deliberate ignoring or infraction of the Sherman Act. Perhaps in no other recent case do all the facts seem to be so clear and well defined. The Southern Michigan case, mentioned in the September TELEPHONE ENGINEER, and other proposed mergers or purchases in West Virginia, eastern Ohio, and elsewhere throughout the country, do not offer quite all the clear-cut elements presented in the Decatur case, as reported at the Indiana convention.

It would seem, too, that it would not be any impertinence to inquire of the receivers of the Central Union as to any knowledge they may have of the matter so rumored, or of any intention or purpose they may have, if they have any, as to the Decatur plant. Possibly the attorneys who are litigating in the interests of the minority stockholders of the Central Union might find the matter interesting and decide that they should become parties to such a situation.

At any rate, as it seems to the writer, the matter is one which TELEPHONE ENGINEER is fully justified in discussing with some care and fullness. Certainly, if competition is the law of the land, and the sentiment of an overruling majority of the public, as so many fully believe, such a case as this is worthy of ample attention and careful consideration.—E. B. FISHER.

Independents Organize in Western Kentucky

At a meeting of the officers and directors of the different exchanges of the Independent telephone companies of western Kentucky an organization was formed to be known as the Independent Telephone Association. E. T. Aisthorpe, of Cairo, was elected president; W. E. Carpenter, of Wickliffe, vice-president, and A. J. Jefferies, of Paducah, secretary and treasurer.

The meeting was attended by members of the different exchanges in western Kentucky and Mr. Pruitt, of Louisville, representative of the Kellogg Switchboard and Supply Company. The object of the organization is the furtherance of the interest of the Independent telephone companies of Kentucky and Illinois.

Indiana Independents Hold Good Meeting

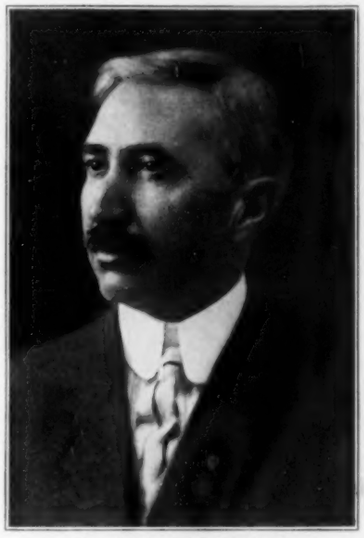
Annual Convention at Claypool Hotel, Indianapolis, September 15 and 16

BY N. S. STRONGE

MEMBERS and guests in attendance at the convention of the Indiana Independent Telephone Association, held at Indianapolis, September 15 and 16, learned that N. C. Kingsbury, vice-president of the American Telephone and Telegraph Company is busy writing the second chapter of his widely advertised effort, "How We Trim the Independents."

The news that Mr. Kingsbury is about to hide the trap for the Independent companies with some of his well-known brand of sugar came in an announcement made by C. Y. McVey of Cleveland, president of the National Independent Telephone Association, who, during the course of an impromptu speech on the convention floor, "reported progress" in the negotiations between the Independent and Bell interests.

"We have held several conferences with Mr. Kingsbury," said Mr. McVey, "and we expect to be able to present a working plan agreeable to all companies within a week or two from the outlook at present."



H. F. Farwell, President.

The McVey announcement was not received with any especial enthusiasm by the convention attendants in face of the lack of details which were withheld. Some of the more prominent Independents present were outspoken in their disapproval, declaring that they certainly were entitled to know the lines along which the proposed working agreement is being planned. One independent declared that this was an insult to telephone men.

While nothing definite could be learned, it was declared on excellent authority that the chapter upon which Mr. Kingsbury is working contemplates feeding the apple to one or two of the larger so-called "Independents" and leaving the core, of which there will not be any, to the small companies. The new plan, it is said, will be tried out by one or two of the larger companies now posing as Independents but really Bell owned. Later, in the absence of any chance of its being a failure, the Bell interests will suggest that the plan be extended to a few of the larger real Independents. Then a neat little business fence will be erected around the smaller Independent companies and the dreadnaughts of the Bell organization will proceed to blockade the port and cause business starvation.

This is the present plan as outlined by one of the more prominent Independent operators who declares that he will have nothing to do with the scheme and advises all other Independents to follow a similar course.

"The Bell companies cannot give us a square deal," said this operator, "because a square deal to us means death to them. We must go along organizing and fighting until we have one strong Independent association unified to the same or more strength than the national Bell organization of today. These conferences can amount to nothing. We must fight the monopolistic interests with legal weapons to obtain our business rights. They are far too suave in their dealings for the average Independent."

Frank E. Bohn, Secretary.

M. F. Hosea, Treasurer.

Walter J. Uhl, Retiring President.

While the statement by Mr. McVey on the new Kingsbury conference was considered of importance, the two days of intensified Independent telephony during the Indianapolis meeting resembled more a national than a state convention owing to the many prominent Independents present from all parts of the country. These men journeyed many miles to pay homage to the Indiana Independents, who have continued to make a fight for their rights in the face of great odds.

Besides Mr. McVey, who journeyed from Cleveland, Ohio, there were present E. B. Fisher, Grand Rapids, Mich., president Independent Telephone Association of America; W. H. Bryant, Mobile, Ala., vice-president Independent Telephone Association of America; G. W. Robinson, Tri-State Telephone and Telegraph Company, Minnesota; W. S. Vivian, secretary, Independent Telephone Association of America; A. F. Adams, Kansas City, Mo.; Terry W. Allen, Corinth, Miss.; A. G. Bean, Elyria, Ohio; H. D. Critchfield, Chicago, Ill.; S. W. Harper, Wheeling, W. Va.; F. B. MacKinnon, Washington, D. C., secretary National Independent Telephone Association; H. B. McMeal, Chicago, Ill., and Samuel G. McMeen, Columbus, Ohio.

The convention was called to order at the Claypool Hotel on the morning of September 15 by President Walter J. Uhl, of Logansport, after which the telephone men were given the key to the city by Mayor Joseph E. Bell. His address was responded to by N. G. Hunter, a former president of the National and Indiana associations, who severs his connection with affairs telephonic almost immediately owing to his elevation to the circuit court bench in his home state. He tendered his resignation from the Indiana association.

Following the details of convention organization during their waking hours, for two days those in attendance listened to some stirring and instructive addresses by men both in and out of the telephone field.

Charles J. Murphy, member of the Public Service Commission of Indiana, during his address issued a warning to all telephone company purchasing agents to watch their purchases.

"Don't pay above the market price for anything," he warned, "for, if you do, you will find the difference between what you paid and what you should have paid taken from your property valuation. Don't pay good equipment price for inferior equipment. Scrutinize every bill and every piece of material delivered to you. If a company pays $50,000 for a $10,000 property it will be out just $40,000 in our physical valuation."

Following his address, Mr. Murphy was questioned by several of the members who endeavored to get some idea of the manner in which the Public Service Commission reached a conclusion as to the value of the good will of a company. No definite reply was given.

W. S. Vivian, of the Independent Telephone Association of America, talked right out and informed the Independents present that they underestimated the value of organization. During the course of his address on "The Value of Association," he declared that many of the Independent companies failed to place a value upon any association work until something absolutely germain to some certain company was desired. Upon those occasions, he said, the companies do not hesitate to seek the association for free advice, which they always get and, if legal advice, from the best legal talent in the land.

Mr. Vivian cited instances of where companies desired knowledge and received it but refused to give any active support to the Independent association. He called upon all Independents to get together in a vast national publicity scheme to offset the tremendous amount of publicity being done by the monopolistic interests. He suggested that every Independent in the land join the Independent association. He showed them that by joining the association they would have a personal representative at Washington who would receive all of their government papers and keep them informed on the trend of events, which in itself costs a minimum of ten dollars a year, that they would have free legal advice, and that as one of the benefits of the association they would receive monthly a copy of the best Independent journal published. Mr. Vivian showed that through the expenditure of five dollars for an Association membership Independent companies derive an actual tangible benefit of several times five dollars every year.

Other speakers were F. B. MacKinnon, of Washington, who explained the telephone valuation blanks upon which telephone companies must make returns to the Interstate Commerce Commission; J. P. Goodrich, Winchester, Indiana, who gave statistics on decisions by the Public Service Commission, which showed that the Indiana Independents are holding their own with the legal powers of the state; Judge Samuel R. Artman, of the Industrial Board of Indiana, who explained the workings of the Indiana Workmen's Compensation Law, and H. D. Currier of Chicago, who spoke on "Transmission."

The reports of President Walter J. Uhl and of Secretary Frank E. Bohn showed the organization to be in a flourishing condition and give in detail the result of work during the year just passed. In Mr. Bohn's report he gave credit largely to the Indiana Association for the change in the national tax on telephone messages whereby the patron is made to pay the tax instead of the company. He declared that it was the splendid work done by the telephone companies that prevented the passage by the Indiana legislature of a bill making minimum hours for women.

Mr. Bohn said that while the past year had been fair in so far as increase of association membership was concerned, it was not what it should have been and he called upon every member to pledge himself to bring in at least five new members during the next twelve months.

The banquet of the association was held on the evening of September 15. William Fortune of Indianapolis was toastmaster, during the course of the evening calling upon E. B. Fisher, C. Y. McVey, N. G. Hunter, Samuel G. McMeen and W. H. Bryant. All made happy care-free addresses in which the business cares of Independent telephony were forgotten until the convention reconvened on the following day.

The closing scene of the convention was the election of officers at which Walter J. Uhl, one of the most popular commanding officers ever in authority in the Indiana association, relinquished control of the presidency to H. F. Farwell of Terre Haute.

Following his election, Mr. Farwell announced that he was not a speechmaker, but that he did know how to do "chores" and he got right down to work.

Frank E. Bohn, Fort Wayne, was re-elected secretary and M. F. Hosea, Indianapolis, was re-elected treasurer. The former members of the executive committee, with the exception of N. G. Hunter, were re-elected. His place was filled by the election of S. M. Isom of Mitchell. The re-elected members of the executive committee are: Walter J. Uhl, Logansport; Frank E. Bohn, Fort Wayne; H. F. Farwell, Terre Haute; J. A. Browne, Winchester; William Fortune, Indianapolis; F. R. Parrett, Princeton:

W. M. Bailey, Richmond, and E. K. Spencer, Evansville.

Those in attendance at the convention were:

Warren M. Knapp, secretary and manager Flora Telephone Co., Flora, Ind.

George Watts, manager Knightstown Telephone Co., Knightstown, Ind.

J. H. Barnard, secretary and treasurer Daleville Telephone Co., Daleville, Ind.

Martha Kelley Roberts, assistant manager Consolidated Telephone Co., Danville, Ind.

L. B. Morris, secretary Lafontaine Telephone Co., Lafontaine, Ind.

J. J. Brown, secretary, treasurer and manager Consolidated Telephone Co., Danville, Ind.

I. M. Heath, president Chesterfield Telephone Co., Chesterfield Telephone Co., Chesterfield, Ind.

F. M. Foulke, secretary and manager Central Indiana Telephone Co., Sheridan, Ind.

E. E. Boone, president Whiteland Telephone Co., Whiteland, Ind.

E. A. Tull, manager Lapel Telephone Co., Lapel, Ind.

F. F. Mayfield, secretary Edinburg Telephone Co., Edinburg, Ind.

C. S. Smith, manager Citizens Telephone Co., Upland, Ind.

N. W. King, manager, secretary and treasurer Amboy Home Telephone Co., Amboy, Ind.

Delbert Myers, lineman Amboy Home Telephone Co., Amboy, Ind.

Robert Miller, general manager and secretary Indiana Steel & Wire Co., Muncie, Ind.

S. M. Isom, president and general manager Mitchell Telephone Co., Mitchell, Ind.

John C. Pentz, manager Whitney County Telephone Co., Columbia City, Ind.

H. W. Munsell, superintendent equipment Indianapolis Telephone Co., Indianapolis, Ind.

Karl B. Davis, manager Middletown Telephone Co., Middletown, Ind.

F. R. Parrett, treasurer Princeton Telephone Co., Princeton, Ind.

J. C. Boush, general manager Ohio State Telephone Co., Columbus, Ind.

William F. Quale, general manager Northern Indiana & Southern Michigan Telephone & C. Co., LaGrange, Ind.

Hart F. Fannery, president Central Indiana Telephone Co., Terre Haute, Ind.

N. G. Hunter, president Home Telephone Co., Wabash, Ind.

C. William McCrea, secretary and manager S. Morrison Telephone Co., Greenfield, Ind.

W. W. Harbaugh, manager Sullivan Telephone Co., Sullivan, Ind.

W. H. Hosea, traffic manager New Long Distance Telephone Co., Indianapolis, Ind.

Charles E. Koontz, manager Home Telephone Co., Bremen, Ind.

Charles Kingan, superintendent Citizens Telephone Co., Edinburg, Ind.

J. N. Miller, superintendent Fountain Telephone Co., Covington, Ind.

J. M. Sands, secretary Advance Telephone Co., Advance, Ind.

Ora E. Sutton, assistant manager Advance Telephone Co., Advance, Ind.

H. E. Wilder, secretary and treasurer Home Telephone Co., Angola, Ind.

W. M. Bailey, general manager Richmond Home Telephone Co., Richmond, Ind.

W. T. Mellott, president Sullivan Telephone Co., Sullivan, Ill.

John M. Stanley, manager Ladoga Telephone Co., Ladoga, Ind.

Herman F. Kaads, chief accountant Home Telephone Co., Fort Wayne, Ind.

E. D. Allen, secretary and treasurer Pendleton Telephone Co., Pendleton, Ind.

H. H. Davis, Middleton Telephone Co., Middleton, Ind.

C. F. Lawson, Boswell Telephone Co., Chase, Ind.

E. J. Hanes, auditor Indianapolis Telephone Co., Indianapolis, Ind.

F. B. Chapman, general manager Decatur Telephone Co., Greensburg, Ind.

W. S. Smith, secretary Home Telephone Co., Wabash, Ind.

Lewis Signs, secretary Eel River Telephone Co., North Manchester, Ind.

Ham Phend, manager Royal Telephone Co., Milford, Ind.

Claude R. Stoops, manager Nappanee Telephone Co., Nappanee, Ind.

J. L. Arthur, Varney Electric Supply Co., Indianapolis, Ind.

E. B. Cline, general manager Indianapolis Telephone Co., Indianapolis, Ind.

W. H. Steinker, auditor Seymour Telephone Co., Seymour, Ind.

F. M. Hodgson, superintendent Winona Telephone Co., Plymouth, Ind.

Samuel Tomlinson, president Winona Telephone Co., Plymouth, Ind.

T. E. Hamway, secretary Monticello Telephone Co., Monticello, Ind.

Tully Ponticue, superintendent Rochester Telephone Co., Rochester, Ind.

C. A. Warner, Morroco Telephone Co., Morroco, Ind.

Elmer E. Daicey, South Bend, Ind.

S. Hoadley, manager and proprietor Hoadley Telephone Co., Gosport, Ind.

M. L. Glouser, manager Thorntown Co-operative Telephone Co., Thorntown, Ind.

John Trout, lineman Central Indiana Telephone Co., Sheridan, Ind.

Mrs. A. C. Warner, Morroco, Ind.

W. M. Turner, manager Kirklin Telephone Co., Kirklin, Ind.

F. W. Morgan, Argos Telephone Co., Argos, Ind.

L. A. Frazee, Connersville Telephone Co., Connersville, Ind.

E. W. Burch, engineer Public Service Commission, Indianapolis, Ind.

Ira Trout, superintendent Arcadia Telephone Co., Arcadia, Ind.

F. V. Newman, secretary Michigan-Indiana Telephone & Traffic Association, Grand Rapids, Mich.

W. L. Edson, superintendent and wire chief Home Telephone Co., Noblesville, Ind.

C. C. Clark, Lynn Local Telephone Co., Lynn, Ind.

Vernon W. Robinson, wire chief Eastern Indiana Telephone Co., Winchester, Ind.

Robert Britton, secretary and treasurer Roachdale Telephone Co., Roachdale, Ind.

Will A. Ford, wire chief Roachdale Telephone Co., Roachdale, Ind.

John W. Miller, president Roachdale Telephone Co., Roachdale, Ind.

H. S. Reed, manager Mt. Summitt Rural Telephone Co., Mt. Summitt, Ind.

H. C. Marsh, president and manager Shirley Telephone Co., Shirley, Ind.

V. E. Thurman, president and manager Hoosier Telephone Co., Salem, Ind.

C. J. James, Rossville Home Telephone Co., Rossville, Ind.

W. L. Wright, secretary and treasurer Rossville Home Telephone Co., Rossville, Ind.

J. E. Teaford, manager Union City Telephone Co., Union City, Ind.

C. W. Bowery, secretary Lynn Local Telephone Co., Lynn, Ind.

H. W. Hogue, C. L. Elec., Indianapolis, Ind.

R. W. Chapman, salesman White Co., Indianapolis, Ind.

J. Alexander Navarre, eastern sales manager Valentine Clark Co., Toledo, Ohio.

J. K. Johnson, engineer, Indianapolis, Ind.

J. G. H. Klingler, manager Citizens Telephone Co. of Clay County, Brazil, Ind.

H. O. Gorman, chief engineer Public Service Commission, Indianapolis, Ind.

Lewis Signs, secretary Eel River Telephone Co., North Manchester, Ind.

James B. Smith, Oxford, Ind.

F. H. Williams, special representative White Co. Motor Trucks, Cleveland, Ohio.

B. L. Stratton, manager Citizens Telephone Co., Cambridge City, Iowa.

Miss Martner, Spiceland Telephone Co., Spiceland, Ind.

A. R. Martner, secretary and treasurer Spiceland Telephone Co., Spiceland, Ind.
Marie Martner, Spiceland Telephone Co., Spiceland, Ind.
H. C. Goldrick, sales engineer Western Electric Co., Chicago, Ill.
Floyd Kirk, local manager Knightstown Telephone Co., Kennard, Ind.
C. G. Davenport, owner Windfall Phone Co., Windfall, Ind.
H. G. Dorrall, wire chief Hope Independent Telephone Co., Hope, Ind.
George W. Farrel, manager Hope Independent Telephone Co., Hope, Ind.
J. A. Smith, transmitter, Ft. Worth, Tex.
C. C. Carpenter, manager Perrysville Telephone Co., Perrysville, Ind.
Mrs. W. L. Knowles, demonstrator Remington Typewriter Co., Indianapolis, Ind.
Joseph Hume, Carlisle Telephone Co., Carlisle, Ind.
J. H. Killale, treasurer and manager Prairie Telephone Co., Brookston, Ind.
M. Bluinn, manager Ind. Un. Tel. & Tel. Co., Fowler, Ind.
E. Hawkins, manager Home Telephone Co., Noblesville, Ind.
A. B. Diggs, vice-president Winona Telephone Co., Winamac, Ind.
A. E. Durin, purchasing agent Indianapolis Telephone Co., Indianapolis, Ind.
George E. Harbold, wire chief New Long Distance Telephone Co., Indianapolis Telephone Co., Indianapolis, Ind.
W. W. Washburn, manager Western Indiana Telephone Co., Goodland, Ind.
Everett Harred, manager and secretary Flat Rock Telephone Co., Flat Rock, Ind.
George H. Davis, manager Rushville Co-operative Telephone Co., Rushville, Ind.
L. C. Yivvitts, Jennings County Telephone Co., Seymour, Ind.
D. D. Mitchell, manager Martinsville Telephone Co., Martinsville, Ind.
Glen. Hubbart, lineman, Central Indiana Telephone Co., Sheridan, Ind.
A. A. Yerrick, manager Walkerton Telephone Co., Walkerton, Ind.
H. B. Heign, mechanical engineer Indiana Public Service Commission, Indianapolis, Ind.
John K. Bovard, 705 Merchants Bank Building, Indianapolis, Ind.
C. S. Mercer, Seymour, Ind.
W. L. Bott, secretary, treasurer and superintendent Jasper County Telephone Co., Rensaelaer, Ind.
F. A. Gruver, wire chief Jasper County Telephone Co., Rensaelaer, Ind.
John F. Bruner, Hebron, Ind.
L. B. Hensley, Knightstown Telephone Co., Knightstown, Ind.

How the Flow of a River Is Measured

If you see a man leaning over the railing of a bridge intently watching the river, with a telephone receiver at his ear, do not think that he is trying to talk to the fishes or to a diver below the surface. He is probably one of the government's engineers measuring the amount of water passing under the bridge. This is done by lowering an instrument, known as a current meter, into the water at several points under the bridge to determine the speed of the water and by measuring the depths of the water at the same points.

From such information the flow of the river at that particular time and height can be computed, and when such measurements have been made at a number of different heights the flow of the stream at any height can be determined. Then, if a record of the height of the river is obtained each day from a river gage, the flow for each day can be computed. It was in this way that the information in "Water-Supply Paper 353" was obtained.—*U. S. Geological Survey.*

Carlisle, Ky., Gets New Equipment

By J. J. Veatch.

For the purpose of providing additional and more modern equipment and plant, the Central Home Telephone and Telegraph Company is just closing a large estimate on its Carlisle, Kentucky, plant, which included sufficient cable for all cable distribution, eliminating the open wire, which had been a source of continued trouble for several years past, and providing for the continued growth in business at Carlisle and Nicholas county.

It was also necessary to find new and more modern quarters, so a suite of rooms was leased on the second floor of the C. C. Cole building, where the new equipment had all been installed except the switchboard. Saturday night, September 11, at nine o'clock, was advertised as the time the service would be temporarily cut out while the board was being moved. Promptly at 9 p. m. the streets of Carlisle were lined up with patrons of the Carlisle exchange to witness the work of lowering the switchboard out of the third story window of the old building and placing it in its new location.

Everything had been previously arranged, and promptly at the hour named the large blocks and ropes very gently reached in the window, picked up the switchboard, which was two sections of Stromberg-Carlson type, and while its actual weight was about one ton, it was eased to the wagon on the outside as if our crew did nothing else except move switchboards.

Within a very short time the board had been placed at the new location, after which a very substantial lunch was served to the men on the job, and from the collection we were very much reminded of one of our regular employes' meetings—everybody happy and willing to do their full part in carrying out the program. After the lunch, Electrician Wright of the Louisville office, assisted by Roy Benson of the Paris office, immediately commenced the work of connecting the board, which was vigorously pushed the balance of the night and through Sunday, so by Monday morning the Carlisle subscribers were all talking and as happy as ever—or even more so—having been entertained Saturday night by sitting on the curb stone and inspecting the moving of the board. We very much appreciate the good spirit in which the Carlisle patrons took the question of cutting out their service for the move.

While at Carlisle, the writer was told that up to this time there had not been the slightest sign of any friction on this job; that there had not been a single pair in the cable work connected up wrong; that not a single mistake was made in the work of connecting up the switchboard. In expressing our appreciation of praise in this connection, we first mention our general manager for authorizing and supplying us with funds with which to accomplish this; then our general superintendent for engineering and supplying us with proper material with which to do the work; next, our Carlisle manager for his untiring co-operative spirit; then District Cableman L. S. Brown, for his good cable work, and last, but not least, W. C. Collins, construction foreman, who has a record of doing things smoothly.

The Automatic System of Los Angeles

Paper Read Before the American Institute of Electrical Engineers at San Francisco

BY W. LEE CAMPBELL

This paper narrates some of the history and describes the present automatic switchboard telephone system in the city of Los Angeles.

It describes how the system, which began to give service with one manual switchboard in the year 1902, has gradually been extended and transformed through several interesting stages of combined automatic and manual operation, until it now comprises 15 automatic offices and a traffic distributor switchboard which serve a total of 60,000 subscribers' stations—the largest automatic switchboard system in the world.

The layout of central offices in the present plant is shown in contrast with the layout of offices in the Bell telephone plant of approximately the same size, operating in the same city.

The traffic distributor switchboard used for handling the out-going calls from a large number of private branch exchange switchboards is the largest board of the kind in operation, includes thirty operators' positions and handles a heavy traffic. A general explanation is given of the equipment of the board, methods used in operating and of the economies realized by means of it.

Specially interesting and important features in handling the telephone business of a large metropolitan area like Los Angeles are the methods used in caring for calls for time and for information concerning subscribers' numbers, addresses, etc., and for answering subscribers' complaints and calls for long distance connections. All of these methods are discussed at some length.

The paper closes with a concise statement of the practice of using standards of adjustment and performance for securing uniformly good service from the automatic apparatus scattered over this area of about two hundred square miles and handling from 500,000 to 600,000 calls each week day.

ALTHOUGH telephone plants using automatic switchboards are now scattered through nearly all of the civilized countries of the world, and are yearly increasing in number, they are still a novelty to many electrical and some telephone engineers. It is thought, therefore, that a description of an automatic system serving a large metropolitan area like that of Los Angeles, Cal., may prove of interest.

The automatic telephone system, owned and operated by the Home Telephone & Telegraph Company in the city of Los Angeles, is remarkable in several particulars.

1. Starting as a manual switchboard system, it has passed through several interesting stages of combined automatic and manual operation.

2. It has had an extremely rapid growth, in order to keep pace with the growth of the city of Los Angeles, which has been fast.

3. It is now the largest plant operating in competition with the Bell System.

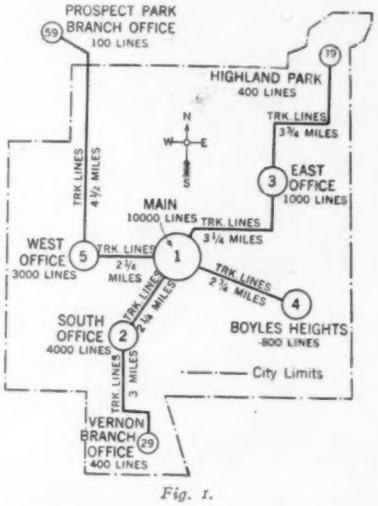


Fig. 1.

4. It is the largest automatic switchboard plant in the world.

5. It embodies the largest and busiest semi-automatic switchboard of the traffic distributor type.

6. It includes an unusually large number of private branch exchanges for a plant of its size.

EARLY HISTORY

The Home Telephone & Telegraph Company began service in 1902 with a manual system using a common-battery, two-wire-multiple switchboard with an ultimate capacity of 18,000 lines, of which 7,000 were at once to be put into service. This board was at that time the very latest development in manual telephony and it was supposed that it would take care of the "Independent" telephone service in Los Angeles for some time to come. But the officers of the company had greatly underestimated the requirements, for the subscription list grew so rapidly that within two years after the beginning of service 10,000 lines were in use and the demand for service was so great that it became evident that only the business district and a portion of the residence district in the south and west sections of the city could be accommodated by the equipment.

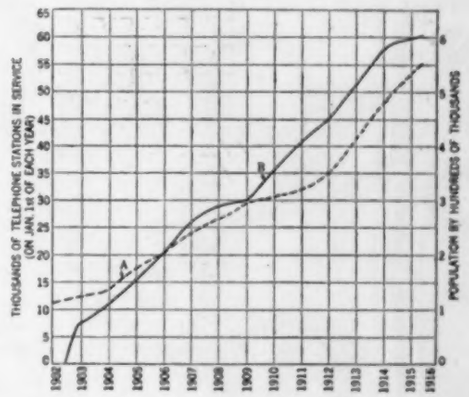


Fig. 2—Curve A Shows Growth of Population of City of Los Angeles from 1902 to 1915, and Curve B Shows the Growth by Subscribers' Stations of the Home Telephone and Telegraph Company for the Same Period.

In those days of comparatively small telephone plants, engineers of "Independent" telephone companies

generally felt that all subscribers' lines in each city should be connected to one switchboard or at least to one central office, but the engineers of the Los Angeles company soon concluded that the cost of connecting all lines in that rapidly growing city to either one switchboard or one central office would be prohibitive. It was, therefore, decided to build a branch office in the south end of the city and thus relieve the main office of about 2,000 lines. The building was erected with a view of installing manual equipment, but after investigating the successful automatic telephone systems at Grand Rapids, Mich.; Dayton, Ohio, and other cities, the officers and engineers of the Home company decided that the automatic system was what they needed and adopted it.

Fig. 3.

Fig. 5.

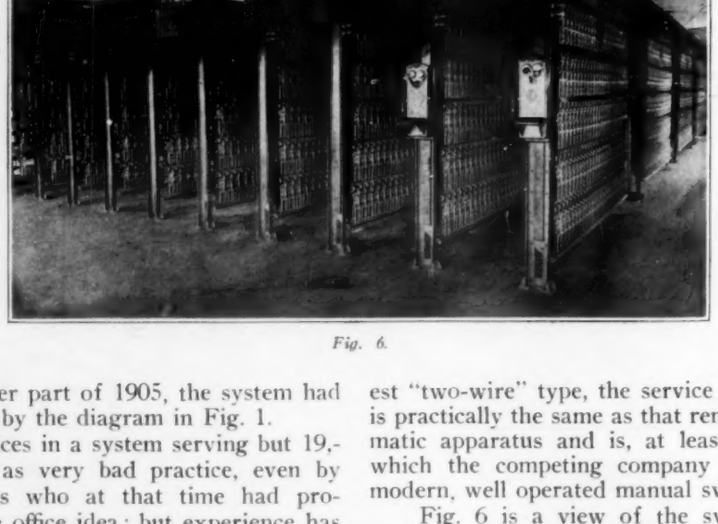


Fig. 6.

The plant agreed upon was, briefly, that the original office was to remain, for the time being, a manual office and was to serve directly only the business portion of the city, while central offices equipped with the automatic system were to be scattered over the city to give service in the outlying districts, and were to interconnect with Main, the centrally situated manual exchange.

First Automatic Central Offices. The first of the automatic exchanges, known as South, and equipped for 4,000 lines, was completed in July, 1904, and was quickly followed by four additional exchanges: Boyle's Heights with 800 lines, East with 1,000 lines, Vernon with 400 lines, Highland Park with 400 lines, Prospect Park with 100 lines, and West with 3,000 lines. Consequently, by the latter part of 1905, the system had developed as represented by the diagram in Fig. 1.

The use of seven offices in a system serving but 19,000 lines was regarded as very bad practice, even by many of those engineers who at that time had progressed beyond the single office idea; but experience has justified the plan, because the great territory to be covered, as shown by the distances in Figs. 1 and 16, together with the enormous growth in population and the corresponding growth of telephone stations, as shown by the curves in Fig. 2, have made a comparatively large number of offices necessary in order to keep the cost of the outside plant within reasonable bounds. In Fig. 2 the ratio of curve *A* to curve *B* is 10 to 1, and the curves, therefore, show in a striking way how very closely that ratio between population and the Home Telephone Company's instruments has been maintained.

The special suitability of automatic equipment to such a multi-office system is fully explained in a paper presented by the writer before the Institute in 1908.

Type of Apparatus Used. It is deemed worthy of note, in passing, that in order to secure the advantages of the automatic system the Home Company had to take a very decided step backward in one particular, *i. e.*, all of the larger manual switchboards then being made, were of the common battery type, while the only automatic telephones available were of the older local battery type (see Fig. 3). During more recent years the automatic switchboards first installed in Los Angeles have all been remodeled to give common battery service, and many of the wall instruments have been remodeled into a smaller type similar to that illustrated in Fig. 4. The type of desk instrument used is shown in Fig. 5. The original apparatus required a calling party to push a button on his telephone to ring the called party, but recently much of the equipment has been remodeled to automatic ringing.

While the telephone instruments used in Los Angeles are all of the "three-wire" type and are somewhat less attractive in appearance than those of the latest "two-wire" type, the service given to the subscribers is practically the same as that rendered by the latest automatic apparatus and is, at least, as well liked as that which the competing company is able to supply with modern, well operated manual switchboards.

Fig. 6 is a view of the switchboards, for serving 4,000 lines, as originally installed in the South office in 1904. This was before the days of Keith line switches and each line, therefore, terminated in a Strowger type first selector. Each of the ten racks in the thousand line group in the foreground of Fig. 6, carries one hundred first selectors, ten second selectors, ten third selectors

and ten connectors. The functions of these switches have been explained in previous papers, and while brief mention will be made here of the method pursued in setting up connections between the automatic offices, it is felt that more interest will center in the methods of interconnecting between the one manual office and the automatic offices.

The Numbering Scheme. Before explaining the system of calling, the numbering scheme should be outlined. All numbers used for complete automatic connections in Los Angeles had five digits.

As indicated in Fig. 1 the South office is the "2" office, *i. e.*, it was arranged to accommodate the numbers from 21,000 to 28,999, of which the numbers from 21,000 to 24,999 were then used.

Vernon is a branch of South and was designed to accommodate the numbers from 29,000 to 29,999, of which the numbers 29,000 to 29,399 were in use.

The East exchange was designed to accommodate the numbers from 31,000 to 38,999, of which the numbers from 31,000 to 31,999 were in use.

Highland Park is a branch of East and used the numbers 39,000 to 39,399.

Boyle's Heights used the numbers from 41,000 to 41,799.

West used 51,000 to 53,999.

Prospect Park, a branch of West, used the numbers from 59,000 to 59,099.

Inter-Connections Between Automatic Offices. When setting up connections with apparatus of the early Los Angeles type, the first selector responds to the first movement of the dial and selects a trunk line to the exchange corresponding to the first digit of the number being called. A subscriber, for instance, of South office (the 20,000 exchange) calling 2 as the first digit, will select a local trunk line in South office; if he calls 3, he will select an inter-office trunk to East office (the 30,000 exchange) or if he calls 4 he will select a trunk to Boyle's Heights office (the 40,000 exchange). The second turning of the dial actuates the second selector to pick out the thousand group in the exchange or its branch office. The third movement in like manner picks out the hundred. The fourth and fifth movements pick out respectively the tens and units on the connector switch. Suppose now a subscriber in the South office wishes to call No. 39,143, which is in the Highland Park office.

The first movement of the dial operates a first selector in the South office which selects a trunk line to East office. The second movement is utilized in the East office by a second selector, which extends the connection over a trunk line to Highland Park office where the call is completed in the regular manner, by a third selector and a connector. Impulse repeaters were used on the inter-office trunks as in present practice.

Automatic to Manual Connections. Any automatic subscriber wishing to call a number in the manual district turned his dial from finger hole 1, which was marked *MAIN* on all dials (see Fig. 3), and pressed the ringing button; this operated a first selector which selected a trunk line ending in a cord and plug on the Main office switchboard and signaled an A operator, who, by throwing a key, put out the signal light and connected herself with the automatic subscriber.

Then, after ascertaining the number wanted, she plugged into a multiple jack of the called line and rung the subscriber. When the calling subscriber hung up his receiver the first selector released, freeing the trunk, and when both subscribers had replaced their receivers, supervisory lamps gave the disconnect signal to the operator. Each operator handled thirty trunks, to which six hundred automatic subscribers had access.

A connection of the character just described is illustrated in Fig. 7.

Manual to Automatic Connections. Besides the twelve incoming trunk positions at Main office, there were four outgoing trunk positions and a trunk multiple which enabled any operator in Main office to trunk a call to an outlying office. When a manual subscriber wanted to call an automatic number, say 24,425, which is in the South exchange, he removed his receiver from its hook and asked central for the number. The operator used an order wire to repeat the number to an operator at a switching section or B board in the South office, who assigned a trunk line, put up the connection and rung the subscriber. Both operators had double supervision, that

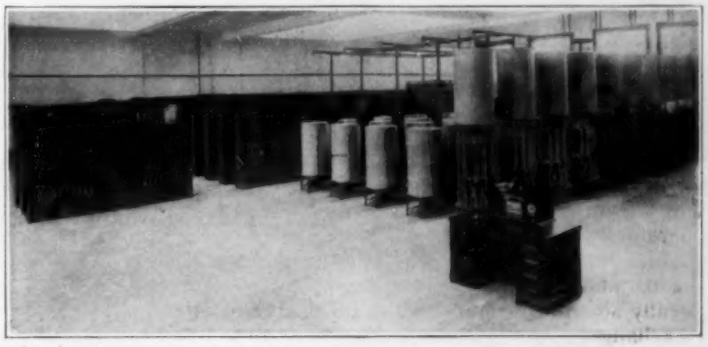


Fig. 11.

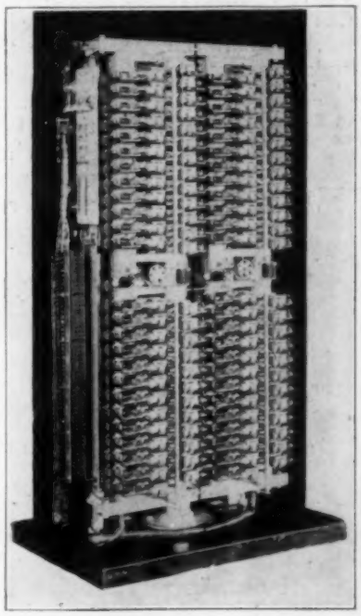


Fig. 16.

Fig. 4.

Fig. 13.

is, they could tell when either or both subscribers hung up their receivers. At the automatic end, in the South office, the switching or manually operated B board was used for handling trunk calls from Main only and the lines from all automatic subscribers to the exchanges were multipled through it. There was a busy test so that when an operator had made a connection to an automatic line, it could not be called by an operator at another posi-

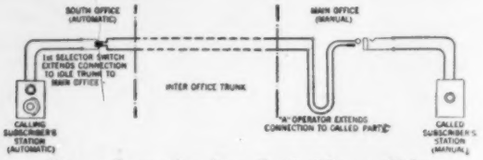

SOUTH OFFICE (AUTOMATIC)
MAIN OFFICE (MANUAL)
1st SELECTOR SWITCH EXTENDS CONNECTION TO IDLE TRUNK TO MAIN OFFICE
INTER OFFICE TRUNK
"A" OPERATOR EXTENDS CONNECTION TO CALLED PARTY
CALLING SUBSCRIBER'S STATION (AUTOMATIC)
CALLED SUBSCRIBER'S STATION (MANUAL)

Fig. 7—Connection from South Office to Main.

tion or by another automatic subscriber, and *vice versa,* when a connector switch had completed a connection to any line, that line tested "busy" to the B board operators.

Such a connection from the manual office to an automatic office is illustrated by the diagram in Fig. 8, and is evidently in conformity with regular manual practice, with the added feature of the inter-working busy test in the automatic office.

B boards of the character outlined were installed in South, West, East and Boyle's Heights offices, but calls to Highland, Vernon and Prospect Park were handled automatically from the four outgoing trunk positions at Main. These positions were used, also, to call into the larger automatic offices at night or at times when the traffic would not warrant having operators at their switching sections. In the Main office there were order wires from every A position to the four outgoing trunk operators. There was also a trunking multiple at each position on the board which ended in cords and plugs at the trunk operators' positions. At the outgoing trunk positions the trunk lines to the different offices ended in jacks.

Suppose a manual subscriber wanted to call an automatic number, 39,225, which is in the Highland Park office. When he took his receiver off the hook, the operator responded and ascertained the number wanted; she then used the first order wire that was not busy and repeated the number to a trunk operator, who assigned the trunk to be used, plugged into a trunk line to the East office and, with a calling device, called 9225. The first number of the call was omitted because the operator per-

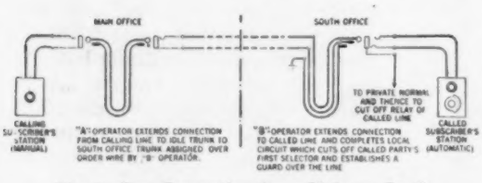

MAIN OFFICE
SOUTH OFFICE
CALLING SUBSCRIBER'S STATION (MANUAL)
"A" OPERATOR EXTENDS CONNECTION FROM CALLING LINE TO IDLE TRUNK TO SOUTH OFFICE. TRUNK ASSIGNED OVER ORDER WIRE BY "B" OPERATOR.
TO PRIVATE, NORMAL AND THENCE TO CUT OFF RELAY OF CALLED LINE
"B" OPERATOR EXTENDS CONNECTION TO CALLED LINE AND COMPLETES LOCAL CIRCUIT WHICH CUTS OFF CALLED PARTY'S FIRST SELECTOR AND ESTABLISHES A GUARD OVER THE LINE
CALLED SUBSCRIBER'S STATION (AUTOMATIC)

Fig. 8—Day Connection from Main to South.

Fig. 10.

formed the function of the first selector, that of selecting a trunk line to the exchange, when she plugged into the proper jack. Calling 9 operated a second selector in the East office which selected a trunk line to Highland Park, where the call was completed in the regular manner by a third selector and a connector. Suitable supervisory signals were provided for the guidance of the operators. Such a connection is illustrated in Fig. 9.

Of course, the subscribers of the Home Company were not acquainted with the steps taken in securing their connections. The manual subscribers knew only that they must make their calls orally, using their telephones as they had been in the habit of doing, and that they secured their numbers. Automatic subscribers understood equally well that all numbers below 20,000 were called through operators, who were secured by dialing number 1.

The automatic subscribers calling automatic numbers dialed their calls in the way usual with the automatic telephone and without knowledge of the offices or mechanisms concerned. The telephone directory made plain to the users which were manual and which were automatic numbers.

Later Method of Making Automatic to Manual Connections. While the arrangement illustrated in Fig. 7 and already described for handling calls from the automatic offices to the manual gave good service, it was slower and more expensive than full automatic service, and therefore, after about two years of operation, by which time the number of automatic lines had increased greatly, it was decided to install equipment which would enable the automatic subscribers to complete connections automatically to all manual subscribers' stations excepting those connected to private-branch exchanges.

This was accomplished by ending the trunks incoming from the various automatic offices, in second selector switches installed at Main office. The bank levels 1 to 9 of these second selectors were used to call third selectors,

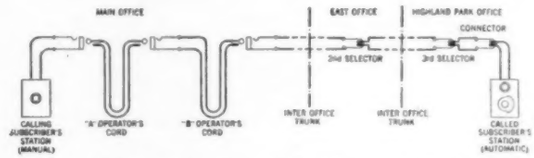


Fig. 9—Outgoing Connection from Main Office to Highland Park Office.

which in turn extended connections to connectors. The banks of these connector switches were multiplied to all the manual lines in Main office, excepting the trunks to private-branch exchanges. All Main office numbers from 1000 to 9999 were made into the five digit numbers required for automatic working by prefixing the letter A before them. On the calling devices the letter A was printed beside the figure 1 (see Fig. 10) so that it took the place of the old word Main in the operating instructions.

When this apparatus had been installed at Main office, manual subscribers secured all of their connections as before, but an automatic subscriber who wanted any Main office individual line, simply spelled out on his calling device the desired party's number and secured connection, without an operator's aid, just as if the wanted party had an automatic telephone. An interworking busy test such as that already mentioned as being used between the B board and the automatic switchboard in each of the various automatic offices, was used between the connector switch banks and the multiple of the manual board in Main office.

To secure connection to a private-branch exchange (P. B. X.) trunk, automatic subscribers were instructed to call 10. The figure "1" caused a calling party's first selector to connect his line to an idle trunk to Main office, where a second selector was operated in response to the "0" and extended the connection to an operator, who took the calling party's order and completed the connec-

tion, by plugging into the jack of a trunk line to the desired private-branch exchange.

MAIN OFFICE ABANDONED.

The next step in the transformation of the system, resulted in the elimination of Main office. This was accomplished by establishing a new central office named Olive in a fireproof building erected for the purpose five or six blocks from the old Main. Sufficient automatic apparatus, using Keith line switches of the early type then available, mounted on round uprights (see Fig. 11), was installed in Olive office to accommodate all of the individual subscribers' lines terminating in Main office, and they were gradually switched over to it. A portion of the manual switchboard, thus freed, was moved to Olive office to handle the p. b. x. trunks in so far as calls incoming from them were concerned, while trunking connector switches were installed so that automatic subscribers from that time on made their connections automatically to p. b. x. trunks also.

The company's headquarters were then moved to the Olive office building and the old Main office building was abandoned and sold. The system was then full automatic with the exception that a portion of the old manual board, transferred to Olive, as already mentioned, and a portion of the old B board at each of several of the larger automatic offices were still operated for handling calls from the numerous manual private-branch boards to the automatic subscribers stations. These connections were set up by the methods illustrated in Figs. 8 and 9, *i. e.*, the full manual method shown in Fig. 8 was used when a call was made during the rush hours for a line connected to an outlying automatic office equipped with a B board, while calls during less busy hours or to the smaller automatic offices were made with dials after the manner illustrated in Fig. 9.

In order to permit this method of handling calls outgoing from the p. b. x.'s to be changed to automatic calling it would be necessary to put calling devices on all of the p. b. x. boards and to remodel some or all of their circuits, and the company felt that its organization and resources could be utilized more advantageously in meeting other demands.

Since the system now serves six times as many stations as it did twelve years ago and much of the growth has been paid for out of earnings, it may be imagined easily that all available energy and money have been needed for taking care of enlargements.

General Plant Design. The great extent of the area to be covered has presented a continuous difficulty. For example, between South Pasadena and a small manual suburban office at Beverly Hills, two offices within the flat-rate unlimited service area, there are twenty-two miles of cable. To maintain a high standard of transmission, a portion of the South Pasadena trunk cable is made up of conductors of No. 16 B. & S. gage and is of special design.

The maintenance of a high standard of transmission throughout the city has been made easier by the comparatively large number of offices used. Increasing the number of offices, shortens the average subscriber's connecting loop. In Fig. 12 are shown the present offices of the Home Telephone & Telegraph Company and of the Pacific States Telephone & Telegraph Company. The latter company serves about the same number of subscribers as the Home Company, and, of course, uses the Bell type of manual equipment. It has nine offices, where the Home Company has fifteen. The difference between automatic and manual practice is especially striking in the southern portion of the city, where the Home Company has six offices and the Bell company three. In outlying centers like Hollywood or Highlands, one office is necessary with either type of equipment.

Good, substantial, central office buildings, especially suited for their purposes, have been erected by the Home Company. The Olive central office and headquarters building is shown in Fig. 13, Adams office buildings in Fig. 14, and the very simple type of construction used for the smaller outlying offices is typified by the Vernon office building, a small square structure. Buildings of this economical character would not be suitable for manual switchboards with the requisite provisions for the convenience and comfort of the operators.

The character of the outside plant construction is first class throughout the city. Cable is used as much as practicable, and all work is done in a large way with the future in mind.

THE PRESENT PLANT.

A skeleton map of the plant as it stands at present is given in Fig. 15. The system includes all of the original automatic offices and a number of new ones, and serves over 60,000 subscribers' stations.

The number of p. b. x. switchboards is 601, averaging 27 stations each and 3½ trunk lines to Olive office.

The approximate number of automatic lines and stations connected to each office is shown in Fig. 15 and the numbering scheme is as follows:

Olive Office	A-1000 to A-5999 F-1000 to F-7999	West Office	51,000 to 55,000 556,000 to 557,999
P. B. X. lines	and 10,000 to 10,999 60,000 to 60,999	Wilshire Office	56,100 to 56,799 568,000 to 568,999 569,000 to 569,999
South Office	21,000 to 25,999 27,000 to 27,999		560,000 to 560,999
Vermont Office	26,000 to 26,699 269,000 to 269,999	Hollywood Office	57,000 to 57,800 579,000 to 579,999
Vernon Office	28,000 to 29,999	Prospect Office	59,000 to 59,899 599,000 to 599,999
East Office	31,000 to 31,999	Adams Office	71,000 to 75,999
South Pasadena	35,000 to 35,999	Normandie	77,000 to 77,999
Highland Office	38,000 to 39,999	Arlington Office	79,000 to 79,999
Boyle Office	41,000 to 41,999		

It will be noted that in several of the smaller offices six digit numbers are now used, and it follows that some fourth selector switches have been installed in those offices.

The dial number disk used at present is the same as that in Fig. 10, except that the words MAIN and LONG DISTANCE do not appear upon it. To save trunks, a three figure number is now used to call long distance, as mentioned further on.

Types of Equipment. All of the original automatic equipment and that installed at various times since the first installation is still in use although as already mentioned the circuits have been changed to common-battery designs and, recently, changes to automatic ringing are in progress. Many of the first selectors originally used for line as well as trunking switches have been re-arranged for use as trunking switches only and the lines, which formerly terminated in them, now end in Keith line switches which have been installed more recently. A type of Keith line switch upright similar to that used for many of these changes and extensions is shown in Fig. 16. The use of these uprights in place of the old Strowger switch uprights, shown in Fig. 6, reduces the floor space required per thousand lines of switchboard about 40 per cent.

The unit or "sectional-book-case" designs used in the construction of automatic switchboards have been of great help in avoiding the sacrifice of any equipment in the many readjustments and enlargements of plant, which have been made necessary by the rapid growth of the city.

Trunk Line Groups. The numbers of trunk lines used between the various offices is given in Fig. 17, which contains many interesting features to which lack of space forbids extended reference.

Traffic. The traffic is quite heavy, averaging per week-day 14 to 18 originating calls per automatic station connected to the Olive office, 7 to 9 calls per week-day from each station connected to other automatic offices and 5 to 6 calls from each of the 16,000 stations connected to manual private-branch exchanges.

The average number of originating calls handled per day by each p. b. x. trunk is about 37, which is 50 per cent higher than the average experienced in full manual plants. It is thought that the increased efficiency is partially due to the automatic setting up and disconnecting of calls incoming to the p. b. x.'s, which shorten the time each such call occupies a trunk.

select a trunk direct to the desired main exchange has been eliminated. Each operator has a set of non-multipled trunks to the first selectors and those switches automatically pick out idle inter-office trunks for her.

The present method has increased the efficiency of the trunks and the accuracy of the dialing, while, at the same time, it has simplified the work of the operators, because they no longer have to mentally divide a number into two sections nor do they have to make a busy test on a trunk before using it.

On account of certain engineering problems, calls to the outlying offices are at the present time sent over special sets of trunks as indicated in Fig. 17; but it is planned to make changes, which will enable all such calls to be sent over the regular automatic trunks, and thus to considerably increase the inter-office trunk efficiency.

The line switches in which the incoming trunks from

Trunks from / Trunks to	A. Olive	F. Olive	West	South	Adams	Wilshire	Vernon	Prospect	Hollywood	Vermont	Boyle	East	Highland	Normandie	So. Pasa	Arlington	Semi-Auto.	L. Distance	Total
Olive	..	..	100	80	59	..	..	..	..	..	20	32	..	..	..	..	..	20	311
West	120	80	..	60	40	106	..	67	53	..	9	14	..	..	..	..	..	..	537
South	116	74	70	..	60	..	77	.	..	58	8	10	..	..	..	..	..	..	473
Adams	60	49	50	46	..	..	..	..	..	..	5	8	..	52	..	25	..	..	295
Wilshire	..	..	142	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	142
Vernon	35	25	20	36	10	..	..	..	..	6	5	6	..	..	..	..	..	..	143
Prospect	20	20	19	11	8	8	..	.	11	..	2	3	..	..	..	..	..	..	102
Hollywood	16	17	40	7	7	6	..	10	..	..	2	5	..	..	..	..	..	..	110
Vermont	..	..	..	80	..	..	..	..	..	..	..	..	..	..	..	..	..	..	80
Boyle	18	9	7	8	5	..	..	..	.	..	..	5	..	..	..	..	..	..	52
East	18	10	7	9	6	..	..	..	.	..	5	..	35	..	30	..	..	..	120
Highland	20	10	7	9	4	..	..	..	..	..	3	5	..	..	..	..	..	..	58
Normandie	..	..	..	..	59	..	..	..	..	..	..	..	..	..	..	..	..	..	59
So. Pasa	10	10	7	6	5	..	..	..	..	..	3	5	7	..	..	..	..	..	53
Arlington	6	7	6	7	9	..	..	..	.	..	3	3	..	..	..	..	..	..	43
Semi-Auto	..	..	100	90	50	..	..	..	..	.	7	20	..	..	..	..	..	9	254
Long Distance	16	10	15	10	9	..	..	..	..	..	5	5	..	..	..	..	37	..	107
Total	457	321	590	459	331	120	77	77	64	64	77	121	42	52	30	25	37	29	2939

Fig. 17.

The total traffic per week-day sums up to from 500,000 to 600,000 calls, of which about 80,000 are from p. b. x. stations.

THE SEMI-AUTOMATIC OR TRAFFIC DISTRIBUTOR EQUIPMENT.

A step in the direction of changing the p. b. x. trunk lines to full automatic sending was taken in 1914, by removing the last of the B boards from the automatic offices and installing traffic distributor apparatus, consisting of Keith primary and secondary line switches in Olive office, between the main distributing frame and the A board used for handling calls received via p. b. x. trunks. In other words, the answering jacks have been removed from this board, and each trunk now terminates in a primary line switch to the banks of which trunks to secondary line switches are multiplied. The banks of the secondary line switches are multiplied to trunks ending in cords and plugs in the A board.

Therefore, when an operator at a p. b. x. inserts one of her calling plugs into a trunk-jack, a primary and a secondary line switch at Olive office instantly switches that trunk into connection with an idle cord circuit before an idle A operator. If the call is for an Olive office subscriber or for another p. b. x., this A operator completes the connection by plugging into the multiple in the usual way, but if it is for a subscriber in any of the other offices, she plugs into an automatic trunk and dials the desired number by using a calling device which is now a part of each operator's equipment.

These automatic trunks end in first selectors in the Olive office so that the former plan of having the operators omit the first digit of the called number and manually

the p. b. x.'s terminate are arranged in groups of 25 each and each such group has ten outgoing trunks to secondary line switches. The secondary line switches are arranged in groups of twenty, and each group has ten trunks leading to plug ending cord-circuits on the operators' positions.

The line switches are of the latest two-wire type, with self-restoring plungers, and are wired especially for traffic distributor work. The pairs of relays for the line switches are mounted under individual covers on a rack placed above the line switch shelves.

Thirty operators' positions, are equipped with twenty cord circuits each and are more than sufficient to take care of the peak load from the 600 p. b. x.'s and 100 intercommunicating systems.

The scheme of wiring each of the 10 trunks outgoing from any primary line switch group to a different secondary group, and of wiring each of the trunks outgoing from a secondary line switch group to a different operator's position, is such that a call coming from any p. b. x. trunk is switched to any one of the operators on duty who may be idle at the instant.

The cord circuits are arranged for automatic ringing both on manual and automatic calls and double supervision is supplied. The cord circuits are so designed also that if a calling p. b. x. operator has had a connection established, and wishes to make another call or again secure an A operator for any reason, she can disconnect instantly by releasing the line switches and immediately come in on another cord circuit. This is possible only after a connection has been established, for each call is locked until the A operator receiving it either completes

the connection wanted or releases the call by means of a key.

There cannot be more than one uncompleted consecutive call in front of any operator, that is, when any position has received a call it is immediately busied to all other calls, until the operator throws the associated key into the ringing position.

On account of the extremely heavy traffic experienced on the p. b. x. trunks, special provision had to be made for taking care of simultaneous originating calls. It was at first found that occasionally during rush periods two or three calls would appear simultaneously in front of an operator, and it was, therefore, arranged so that the operator would answer only one of them and the others would be switched automatically to idle positions. To ensure instantaneous operators' responses, the line signal lamp on each position is connected to apparatus which transmits a mild buzz to the operators' head-receiver. This buzz is cut off as soon as she throws an answering key.

Provision is made for taking care of extreme peak periods by an arrangement of the primary master switches, which is such that when all the outgoing trunks from any group are busy either because of calls or lack of operators, the master switch will not continue to search for an idle trunk, but the call will be stored in the equipment until a trunk is available. Any operator's position is automatically made busy when she removes her talking-set plug from its jack.

The chief operator's desk is provided with supervisory signals, which tell her at all times how many master switches or groups of trunks are loaded to the limit. A supervisory lamp is provided for every master switch, and by observing these lamps, the chief operator can always tell whether she has enough girls at the switchboard to take care of the load.

The traffic distributer has reduced the number of operators required at the peak load in Olive office from 41 to 30, and has eliminated five B operators' positions formerly in the South, West and Adams offices. The engineer of the company estimates that the 30 operators' positions he has equipped will continue to be sufficient even when the business has grown considerably more.

The curves in Fig. 18 show graphically what results have been obtained by the installation of this semi-automatic apparatus. Curve *A* gives the number of unequated calls handled by each A operator during a peg count taken in September, 1914, a month or two before the new equipment was put into service. Curve *C* shows the average number of calls dialed by B operators from the three dialing positions at Olive office to the smaller outlying offices, at the time of the peg count mentioned above.

Curve *B* shows the results in June, 1915, with the traffic distributer in operation and the A operators dialing the calls (about 30 per cent of the total) to outlying offices. It is interesting to note that, in spite of the work of dialing, the average operator completes over 50 per cent more connections than she formerly did at the hour of peak load. Both before and after semi-automatic operation individual operators have been required frequently to exceed the average peak load. This excess sometimes ran as high as 50 per cent with the former arrangement, but now rarely exceeds 25 per cent. Neither September nor June are months of as heavy traffic as the winter months, but they represent average conditions fairly well.

The Home Company's engineer had all the cord-circuit relays assembled and wired in sets with one base for each cord circuit, so that each cord-circuit equipment looks like an automatic switchboard repeater, is provided with a jack and is mounted on a regular repeater shelf. The cabling is so arranged that when the company is ready to change the method of handling the p. b. x. trunks from semi- to full-automatic, it will simply mean removing the present cord-circuits from their jacks and replacing them with repeaters designed to transmit impulses direct to first selector switches.

All calls from any automatic telephones to the p. b. xs. are handled automatically through rotary connectors, just as before the traffic distributer was installed. As already explained, all the p. b. x. trunks are multipled to the banks of these connectors, so that it is impossible for connectors to stop on trunks which are in use either by a p. b. x. for outgoing calls therefrom or by a traffic distributer operator on calls to p. b. x.'s.

These connector switches are of special design, for the circuit of each is such that if an automatic subscriber calls a p. b. x. and, when through talking, hangs up his receiver before the attendant at the p. b. x. removes her answering plug from the trunk jack, his connection will not all be released, but, contrary to the usual practice, the connector switch will remain connected to the trunk until the attendant at the p. b. x. removes the plug from the trunk jack. If it were not for this provision, the line switch associated with the trunk would operate, because of the plug being in the jack at the p. b. x. after the connector switch released, just as if the p. b. x. operator were initiating a call. The result would be that a traffic distributer operator would receive a false signal.

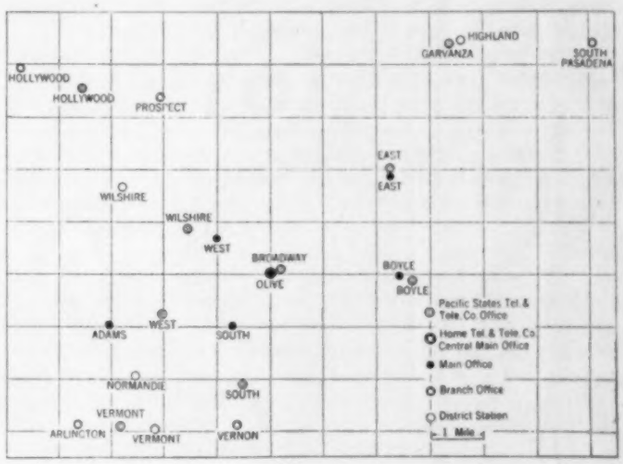


Fig. 12.

To take care of the extremely heavy traffic, 44 connectors are provided for completing calls to each group of 100 p. b. x. trunks.

SPECIAL SERVICE FACILITIES.

Calls for Time. The Home Company receives thousands of inquiries daily for the time-of-day.

The call-number for such service is F-91. This call switches each inquirer to an idle trunk which leads to the Home Company's own p. b. x. board, at which all such inquiries are answered by the operator on duty.

Since these particular trunks are used for no other purpose, the operator answers a signal on any of them by throwing a key and stating the hour and minute, without asking the caller what he wants. If several calls come in within a short period of time, thus occupying sev-

eral trunks at once, she can speak to all of the inquirers at once.

The p. b. x. operator had some spare time, so that she very readily handles this service at no inconvenience or additional cost to the company.

Calls for Information. A party wanting connection to an information operator calls the number F-93, and by means of first, second and third selector switches is trunked to the information board which is located in Olive office.

All of the four to six thousand information calls made daily are handled on an eight-position switchboard and one call distributer position. The incoming information trunks terminate on the distributer position. There is an operator on this position during the busy hours of the day, and her work is to manually route the incoming information calls to idle information clerks.

There are before her eight small groups of jacks connected to trunks to the eight different clerks' positions, and, as the incoming information trunks end in plugs and cords, it is a comparatively easy matter for the distributing operator to plug the calls through as they come in, so that no clerk will have more than one unanswered call in front of her. This ensures practically instantaneous responses. At peak periods, when more than eight information calls may come in at once, the distributer operator herself answers the overflow calls by saying, "Information, just a moment, please."

A calling subscriber when so answered, and even if he should have to wait 10 or 15 seconds for his information, is more satisfied than if he had to wait some time without being told he had reached the desired department.

The distributer operator acts also as supervisor over the other information girls. Disconnection supervision is given on the distributer position and on the individual positions. During times of light load all the information trunks are plugged through to a few of the information positions, and the distributer operator and any clerks, who are not required, are dispensed with.

The information desk is four-sided with two clerks'

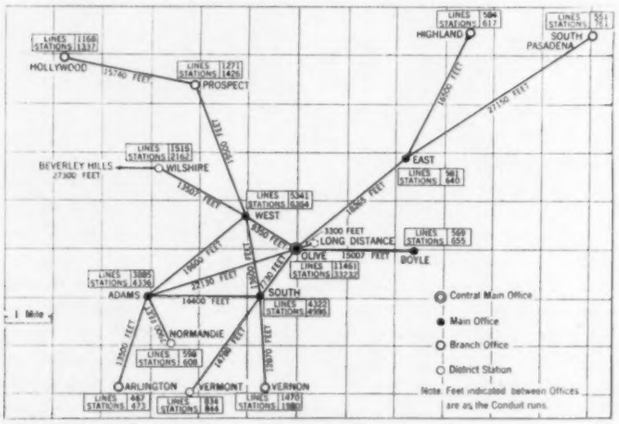


Fig. 15.

positions on each side and the distributer operator is at a separate desk. Every clerk's position is provided with an inter-leaved directory for use in supplying alphabetical information. In the center of this desk is a rotating-turret card-file which affords full numerical and geographical information for the whole plant and to which all clerk's positions have ready access.

Changed-Number Service. This service is taken care of at the present time at five different district centers. At each of these centers there is a special test desk used for various purposes, and on this the changed-number trunks are terminated in different groups of jacks corresponding to the various classes of service, such as "take-outs," "moves," "special refers," etc.

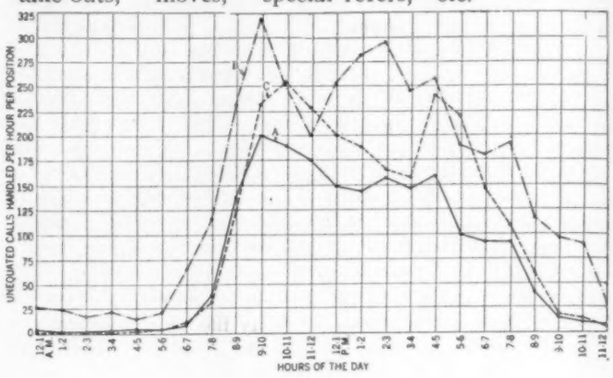


Fig. 18.

Recently the Home Company has tried the experiment of connecting the switchboard terminals of "take-outs," *i. e.* subscribers whose telephones have been taken out, to a pair of busbars supplied with current which will produce a peculiar tone in the receiver of any party who may attempt to call such a line and who consequently will be automatically switched into connection with these busbars.

It has been found that subscribers very quickly learn the meaning of such a tone, and in addition to the saving of attendant's hire, there is an advantage to the subscriber in that he will hear this tone in less time than if he had to wait for a clerk to respond.

At one time, all the "dead-level" calls, *i. e.* calls for numbers which have never been used, were answered by attendants, but it was found later to be much more satisfactory to supply this special tone on such connections, and that a subscriber calling an unused number either accidently or otherwise, would almost immediately, upon hearing the tone, hang up and call again. This latter scheme was adopted only after an extended series of tests had been made to determine the reasons for subscribers making dead-level calls. This showed that in very nearly all of such cases, the subscriber had transposed his figures or in some other way confused the called number, and that when informed by the attendant that he had made a mistake, he rarely repeated his error.

On each changed-number position there appears also a multiple of all the outgoing trunks from the office, and the attendant makes periodical tests on every inter-office trunk for impulse and conversation transmission efficiency. In several offices the same girls do general record work also, and answer the calls incoming to the office from company employes.

This changed-number service is handled at five centers instead of one, because it is possible to connect to one trunk only a limited number of the lines, the calls for which require such service; and on account of the transient nature of a considerable portion of the population of Los Angeles, especially during the tourist season, it would be necessary to use an excessive number of valuable inter-office cable pairs for the changed-number service if it were concentrated at one point.

Complaint Service.—The complaint service call number is "0." Complaints also are received at five

district centers. A special feature in Los Angeles is the method for handling the so-called "double-number" complaints. Such complaints are peculiar to automatic plants, and in most cases are such calls as would be satisfied in a manual plant by the operator saying, "They don't answer" or "I am ringing them"; or cases where a supervisor would be summoned to verify busy reports, etc.

In Los Angeles, when a subscriber reports that he cannot get a wanted number, the complaint clerk immediately calls the number desired on an outgoing trunk of her own. If she secures a response from the called party, she then directly switches the complaining party into connection with the called party via the trunk used by her. It has been found that in about 66 per cent of the cases, the complaint clerk is able to get the wanted party.

The complaint clerk is enabled also to cut in on any busy line to determine if it is "busy" because it is actually in use or because the wanted party has left his earphone off its switchhook. She has means also for testing on any "no-response" call to determine if the bell of the called station is actually being rung or not.

At one time it was the general practice to have an experienced automatic switchboard attendant or tester

Fig. 14.

respond to each of these complaints by asking the calling subscriber to dial the desired number under the supervision of the tester. This was for the purpose of detecting any possible disorder which might have caused the complaint, but inasmuch as the records showed that two-thirds of all such re-calls secured a response from the wanted party, and nearly all of the remainder failed because of legitimate conditions, such as absent subscribers, delayed responses or actually busy lines, it was concluded that this was a very inefficient method for the company, and resulted in much loss of time by calling parties. The present method was therefore adopted.

It was at first suggested that the subscribers might be inclined to abuse the new method of handling such complaints; that is, that some might be inclined to call a complaint clerk and have her dial all of their numbers for them, but during eighteen months of close observation with the new method in use the "double-number" complaints have not exceeded the original number of 1 per 300 calls, or 1 per station per month. It is, of course, only logical that the fear of abuses should have been ungrounded, because telephone users almost invariably prefer to make their own connections.

Testing Lines and Subscribers' Stations.—All of the outside plant testing and all dispatching of repair men is done at five district centers. At the one time, each of the fifteen individual offices handled all such work for its own district, but by combining the small districts into larger ones, it was found that the repairmen could be worked at much higher efficiency and that troubles were removed more quickly.

Test-conductor switches are installed in all the offices, so that by using his dial the wire-chief or line-tester, at each district center, can make immediate connection to any office and to any line therein that he may have occasion to test.

This centralization of outside plant testing is of comparatively recent development and is thought to be especially practicable in automatic systems. It has been planned to combine some day the present five groups into two or possibly one. That has already been done in the routing and dispatching of service-tap crews, all such work being very satisfactorily handled from one desk in the Olive office.

Method of Setting up Long-Distance Calls.—The long-distance lines, to which the Home Telephone and Telegraph Company connects, are owned and operated by the United States Long Distance Telephone & Telegraph Company and serve the commercial district about Los Angeles. They connect in the south with the automatic system at San Diego, run north 200 miles to Santa Maria and east to San Bernardino and Red Lands.

Los Angeles subscribers now secure Long-Distance by calling a three figure number, F-95. The first figure of this number gives a calling party an idle trunk to Olive office where the second digit actuates a second selector which picks out an idle trunk to a third selector. This third selector responds to the figure 5 by extending the connection to an idle cord circuit on the position of a recording operator, who takes the patron's order in the way that is common practice everywhere and tells him that he will be called when the wanted party has been secured.

The only other feature peculiar to automatic practice in handling such a connection is the work done by the line operator in calling the automatic subscriber when the party wanted by him is on the line. All calls from line operators for subscribers in the Olive office are completed by a switching or special B operator in Olive office, who has access to the full multiple of all lines which is used by the operators who handle the p. b. x. trunks. Calls for all other offices are completed by the long-distance operators themselves by means of dials. Each line operator has access to a certain number of outgoing trunks to first selector switches which are situated in the long distance office, and from the banks of these first selectors, trunks are run to the various main offices throughout the city, where they terminate in second selectors.

Long-distance Automatic Calling.—Not only do the Los Angeles automatic switches establish about half a million local connections daily, but practically all long-distance calls originating within fifty miles of the city and completed through the Home company's plant are set up by these same switches in response to calling-devices which are installed upon the various long-distance boards in the surrounding territory, and manipulated by the operators presiding over them. In fact, one exchange one hundred miles from Los Angeles dials its calls to subscribers in that city.

This method of setting up and taking down long-distance connections speeds up the service very decidedly and thereby increases both the patron's satisfaction and the efficiency and earning power of the long-distance lines. One does not realize how very important speed is in a

territory served like this by competing long-distance lines, until he learns that it is fairly common practice for a busy patron to order up a desired connection over both lines, to talk over the one which is ready first and to cancel the order given to the slower competitor.

Flexibility of the System.—The various kinds of service mentioned in the foregoing pages, and others such as fire calls, police calls, etc., to which reference might have been made, show how flexible is automatic switching equipment and how well adapted to fullfill the requirements of modern telephone service; otherwise it would not have been possible to gradually build up, in the face of the keenest competition, the great successful system serving the people of Los Angeles.

Proper Standards Ensure Good Service.—When one not thoroughly initiated into the mysteries of automatic telephony is informed that for an average automatic connection in a system like that in Los Angeles, the selector and connector switches perform fifty separate and distinct operations, making a total of over twenty-one million per day for the system, and that if the mechanisms fail in one of these operations, some patron fails to secure the party he calls, the novice wonders that any individual or organization ever had the temerity to attempt to supply telephone service automatically. In fact, he is inclined to accept without question the statement of an old, dyed-in-the-wool manual telephone engineer, who upon first hearing of an automatic switchboard, exclaimed, "God never intended that telephone service should be given in that way." But as one becomes somewhat better acquainted with the apparatus he begins to understand that the selector and connector switches are all alike in most of their mechanical features and are each constructed and adjusted to operate beyond certain limits of line resistance, capacity, inductance and leakage, which are entirely feasible and practicable. These limits are no narrower in the automatic system than they are in manual systems, and, in truth, the mechanisms readily operate beyond the limits which are necessary to keep the transmission of conversation up to a reasonably good standard. Therefore, although every connector switch in the Los Angeles system must be ready to respond at any time to impulses sent from the calling device of any one of the 45,000 automatic telephones, scattered all over an area of about 200 square miles, no serious difficulty and no element of chance is encountered. Nor is it necessary or possible to adjust each switch to the various lines. On the contrary, the switches are not adjusted to the lines at all, but to certain standard, artificial lines whose characteristics are more severe than those of any of the real lines in the entire system. Thus by the use of a few easily attained standards, an operating problem, which appears at first glance to be very complex and mysterious, becomes so simple that when attacked by the efficient, well supervised organization of the Home Telephone & Telegraph Company the result is unexcelled telephone service—a result much appreciated in the commercial and social life of the city of Los Angeles.

I wish to express publicly my indebtedness to Mr. Leo Keller, chief engineer of the Home company, for his valuable assistance in supplying data for this paper.

American Association of Engineers Meet

The American Association of Engineers held a "Booster Dinner" at the Hotel La Salle on September 14, which was well attended by members of practically all the branches of engineering from Chicago and various parts of the country.

W. D. Wilcox, president of the association, was toastmaster. During his remarks he brought out very aptly the application of the monad to the emblem of the Association. "In the monad, which has been selected as our emblem, we can find many suggestions which do not appear to the superficial observer. As the earliest symbol of philosophic thought we recognize in it our indebtedness to the past.

"Applying it to the present, we may liken the two figures of white and blue to capital and labor, the two great factors of industry. Equality in size suggests equality of right. Taken together they form a complete circle, the emblem of efficiency in that it contains the largest possible area which can be enclosed by a line of given length. The monad is supported by a field of red—this is the field of knowledge, the field of the engineer. Its greater area suggests that the engineer deals not only with the realized, but extends his activities into new fields of endeavor. It supports capital and labor, making them productive by intelligent directions, and offers to them at all times an opportunity for wider fields of employment."

Prof. F. H. Newell's paper on "The Engineer Awakes," was then read. Abstracts from this paper does appear in Telephone Engineer. G. W. Cummings, telephone supervisor of the city of Chicago, spoke on the "Ritual," bringing out particularly the need and value of a ritual in raising the standard of ethics. This was followed by the address of Garrison Babcock on "The Working Engineer," who brought out a parallel that the engineer supplies specifications for work done by the human laborer and is therefore a builder of human instinct supplying that sense lacking in mankind which enables the beaver to build dams and the carrier pigeon to find its home. Edmund A. Woodward spoke on "Civic Military Organization" and brought out the fact that it is impossible for the engineering profession of the United States to be of assistance to the government in case of war, excepting through those channels at present recognized by the government—the regular army or through the militia. W. W. DeBerard, western editor of the *Engineering Record,* spoke on "Publicity," its value to the engineer. Mr. Krom announced the formation of a national membership committee, on which the names of engineers of national reputation are to appear. Arthur Kneisel, secretary of the association, spoke on "Food for Thought and Action." In this talk the secretary brought out pointedly the need for self-examination and self-analysis on the part of the engineer in placing any blame or censure for apparently unsatisfactory conditions in the engineering field. An urgent appeal was made for an awakening among engineers to the need for the commercialization of their efforts and the need for team-work among engineers in the education of the public as to the real advantages gained through the work of engineers. The report of the work accomplished by the association to date was highly satisfactory, as was indicated by the substantial increase in membership gained at the end of the meeting.

Preparations have begun for the first annual convention to be held at Hotel La Salle, Chicago, December 10 and 11, to which convention all engineering societies and clubs are invited and urged to send delegates to discuss the needs for co-operation among engineers, educators and the employers of such, and to assist in solving the great problem which is confronting them.

Telephone Talks

The October, 1915, Installment of an Instructive Serial Course for all Telephone Workers

BY G. W. CUMMINGS AND ARTHUR KNEISEL*

THE pipes and other stimulants to concentration being in full activity, the Repairman started the discussion.

"Our president has the happy faculty of saying that we are going to do something big, and then passing the buck to someone else to do the real work," he began. "I suppose he is going to tell us that the subject of the evening is transmission losses, but before he does it I would like to find out what it is that we are going to talk about; what we mean by transmission losses as well as what causes them."

"The point is well taken," responded the president. "I suggest that the Tester give us a suitable definition before he starts his analysis."

The Tester began. "Suppose that you had an air compressor at one end of a pipe line and an air motor at the other, would you expect to get as much power out of the motor as you put into the compressor?"

"No, of course not," answered the Repairman.

"Why?"

"Well, there is some loss in all machinery, I suppose."

"True, but let's be more specific," insisted the Tester.

"Well, I suppose there would be some 'slip' in the compressor, some cooling and friction in the pipe, and some friction and probably leakage in the motor," said the Repairman. "But I thought you were going to give us the definition. Are you a candidate for president, too?"

The Tester smiled. "I merely wanted to show you that you knew more about it than you thought you did," was his comment. "You have a very clear idea of transmitting loss, line loss, and receiving loss. You see the trouble with the most of us is that while we are really familiar with the principles involved, when the need for exact expression makes it necessary for us to use some words that we have not been accustomed to, we get frightened and think that the subject is fearfully mysterious, difficult, and obscure. When we talk into a transmitter we do a certain amount of work on it, and the power consumed reappears in the form of sound waves in the receiver. Perhaps the principal difference between transmission losses in telephony and in air or water power transmission is that the electrical losses can usually be figured more simply and definitely than others.

"In a general way we know that since no apparatus is perfect—using the word 'apparatus' in the broad sense which includes everything used in the operation—there must be some loss in the transmitter, cord circuit, line, receiver, and everything else used in setting up the connection. Since the telephone current is so exceedingly small in amount and complex in wave form, however, we cannot measure the loss directly by means of an ammeter and voltmeter as we can in an electric lighting or power circuit, and so instead of expressing the loss in watts or percentage as we would in that case we say that putting a certain piece of apparatus in the circuit brings in the same loss as adding so many miles of cable. A mile of cable having a certain capacity and resistance will cause a certain definite loss in transmission, and so we take as our standard unit for measuring loss one mile of cable having a capacity of .054 microfarads and a loop resistance of 88 ohms. For convenience we usually use artificial cable consisting of the proper amount of capacity and resistance so arranged in a box that the equivalent of any desired number of miles of actual cable can be switched into the circuit.

"Suppose, for example, that we want to know just how much difference there is between two repeating coils. We arrange the test circuit so that either coil can be switched in at will, and then cut enough artificial cable in series with the standard coil so that we get as good transmission through the poor coil alone as we do through the good coil plus a certain number of miles of cable. Then the loss in that coil can be expressed directly as the equivalent of that amount of cable.

"It might be interesting to note, in passing, that standard practice aims to keep the total loss in a metropolitan exchange district within eighteen miles, and when you realize that the actual mileage on a connection from the north to the south sides of Chicago, for example, may very easily be more than this, that commercial cable brings in a greater loss than the standard cable used in the measurement, and that the necessary repeating coils, cord circuits, etc., cause additional losses, you begin to see something of the engineering problems involved in furnishing telephone service in a large city. You can get quite satisfactory transmission out of the crudest of apparatus and cheapest of lines when all you want is local service in a small exchange, but do not make the common mistake of assuming that similar methods will give equally satisfactory results in a large city or on long distance service. Only the most careful weeding out of every bit of avoidable loss has made it possible to talk satisfactorily from Rogers Park to West Pullman in Chicago, or from New York to San Francisco.

"So much for what we mean by transmission losses, and how they are measured. Now for what causes them. The causes are four: Shunts and self-induction, which we considered at our last meeting, resistance, and electrostatic capacity. Apparatus which is not designed to meet the conditions properly or which is out of adjustment may, of course, cause a serious loss. Design, however, is up to the manufacturer, not us, while the remedy for faulty adjustment is obvious. A discussion of these two points would involve a detailed study of apparatus, design and maintenance, which is too big a subject for tonight, and which is rather aside from the general principles in which we are interested just now.

"Of the four causes mentioned, the first two are concerned mainly in apparatus losses and the other two in line losses. Clearing-out drops and retardation coils are often bridged across the talking circuit, for example, and the shunting loss which they cause is minimized by making their self induction as high as possible. In order to have supervision in common battery service we must—except in certain special cases—talk through a relay, and the loss in the relay due to its self induction must be cut down as much as possible by shunting it with either a non-inductive winding or a condenser. A shunting loss can occur on the line only when there is a partial short

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circuit, which is a case of trouble to be located and cleared, while the self induction of the line can usually be neglected. Where self induction exists in the line it is usually a benefit instead of a source of loss and is often added intentionally, as we will find later.

"The resistance loss does not need very much discussion. Ohm's law tells us that the current in any line is equal to the electromotive force divided by the resistance, or in other words, that the current is inversely proportional to the resistance. We cannot eliminate resistance any more than we can the other sources of loss, but reducing it means simply the use of larger or better wire. This usually simmers down to a question of balancing transmission volume against expense. In toll cables, where the lines are few and long, and transmission must be kept up to the highest possible point, 13 or even 10 gauge conductors are commonly used. Exchange cables are shorter and consequently cause a smaller total loss, while the number of lines in them makes it necessary to economize space to the last degree, so there we use 19 or 22 gauge, or even smaller. By taking up more space in the streets we could use a larger gauge and reduce the loss in our exchange cables to some extent, but the gain would not warrant the increased expense. Even there, however, we cannot economize too far, and it is poor policy to use so long a stretch of 22 gauge cable as to bring in a serious resistance loss.

"On open wire lines we find a similar condition. Exchange lines are comparatively short, and we can use almost any wire which will stand up; while on toll and long distance lines we use a heavier wire, partly because of its greater strength, but more because of its lower resistance. Still further: In spite of its higher resistance, standard practice allows the use of iron wire in small country exchanges, where the air is clear, although the smoke and gases of a large city require the use of copper. On toll lines, however, copper must be used to avoid a serious resistance loss.

"One other point, and we can leave this part of our subject. In common battery service resistance causes a loss in two distinct ways. In receiving we need consider only the drop due directly to the resistance, while in transmitting the line resistance cuts down the supply of current to the transmitter and effects its efficiency as we discussed when we were studying the telephone set last April.

"The loss due to capacity is somewhat less easily explained, and involves some study of the principle of the condenser, which is perhaps the most generally misunderstood piece of apparatus in common use.

"In many respects electricity behaves like a gas, such as ordinary air. You can store up air in a tank by putting it under pressure, and the amount of air in the tank depends directly on the pressure. By doubling the pressure you double the amount of air in the tank, and so on. Electricity cannot be stored in a tank, but it can be stored on the surface of any conducting body, and the amount on that body depends directly on the pressure, or electromotive force. There is probably no such thing as a point of absolute zero potential in the universe, but we have to have some starting point, so we take the potential of the earth as our zero. Anything which has a higher electrical pressure than the earth we call positive, and anything lower, negative. It follows, of course, that a positively charged body has more electricity per square inch of surface than either one at zero potential or one which is negative. Either a high pressure of air or a vacuum in your tank is an abnormal condition, which will relieve itself if you open the tank. Similarly, either a positive or a negative charge is an abnormal condition, which will discharge through any conducting path. It is this action of electricity which has given rise to the common expression that like charges repel each other, while unlike charges attract. Positive and negative charges attract each other because the positive charge is trying to get rid of its excess electricity and the negative charge is trying to get enough electricity to bring itself up to normal.

"Suppose that we have two metal plates parallel and close together, but insulated from each other, and that we connect one of them to the positive pole of a battery and the other to the negative. You will remember that at our meeting last May we found that a battery was practically a pump of electricity, and so in this case the battery will evidently draw some electricity out of the plate which is connected to its negative pole and force a corresponding amount into the other plate. That is what we mean by charging a condenser, and a condenser is nothing more nor less than two plates like this. Its capacity varies directly with the size of the plates and inversely with the distance between them, while the amount of the charge varies with the pressure in just the same way that it does in the case of a gas tank. If we disconnect the condenser from the battery and connect the two plates together the pressure of the positive charge will force it over into the negative plate and the condenser 'discharges.'

"A commercial condenser consists of two large sheets of tinfoil separated from each other by paraffined paper, rolled up compactly, and protected by a tin case. Each tinfoil sheet is brought out to a terminal, and when these terminals are connected to two points between which a difference of potential exists the sheets are charged to an extent depending on the capacity of the condenser and the difference of potential. The capacity most used in telephone work is two microfarads, that is, the condenser will hold two millionths of a coulomb at a pressure of one volt. This may also be expressed by saying that forcing two millionths of a coulomb into it will raise the difference of potential across its terminals to one volt, or a current of one ampere flowing for two millionths of a second will charge it to a pressure of one volt, or two millionths of an ampere flowing for one second will produce the same result. From these figures you will see that with currents of the usual strength it doesn't take very long to charge a condenser, and for most practical purposes we can consider its action as instantaneous.

"Since the tinfoil sheets are carefully insulated from each other it is evident that no current ever actually flows through a condenser. Connecting it to a source of a steady potential causes an impulse for an instant only, while the condenser is charging, and then the current stops, because the sheets have all the charge they can hold at that pressure. Raising the pressure will, of course, charge the condenser to a higher potential, while lowering it will cause a partial discharge.

"With continuous current the action of a condenser is very simple. With pulsating or alternating its action is not difficult to grasp if we use a little imagination. With pulsating, it is merely a case of continual charge and discharge. As each impulse comes on the condenser charges, and it discharges as the impulse dies away. Do not forget, however, that in drawing electricity out of a condenser on discharge you are moving it in the opposite direction from what you are when you force it in on the charge, in just the same way that the direction of air to

or from a tank depends on whether you are charging or discharging the tank. In this way cutting a condenser in series with a circuit carrying pulsating current converts the current into alternating, and enables us, for example, to ring a bell with pulsating current without using a biasing spring.

"With alternating current we first charge the condenser in one direction, then discharge it, and then charge it in the opposite direction, and so on. For most practical purposes the result is the same as if the condenser allowed alternating current to pass through it, offering an impedance depending on the capacity of the condenser and the frequency of the current.

"We may appear to have wandered somewhat from the subject of the evening, but I have done it because the action of electrostatic capacity is more easily grasped when it is concentrated in a condenser than when it is distributed over a line, while the same principles apply in both cases. There are only two ways in which we are concerned with transmission loss due to a condenser; when we talk through it and when it accidentally becomes bridged across a circuit. The impedance which a two

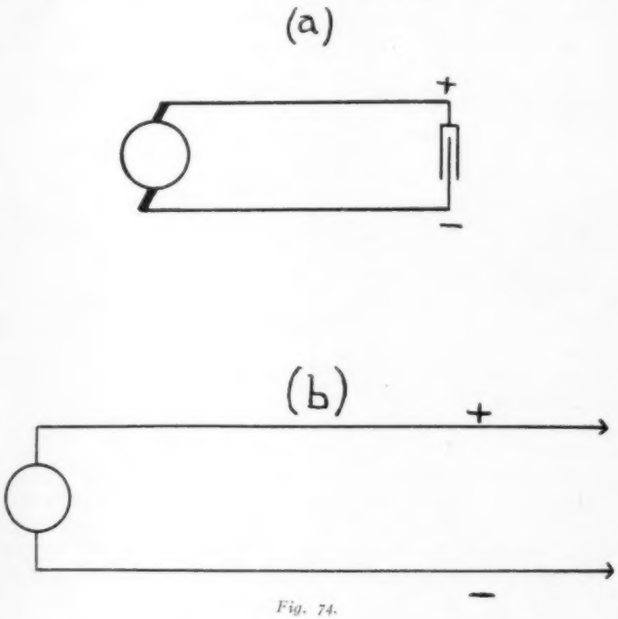


Fig. 74.

microfarad condenser offers to the high frequencies used in talking is too slight to cause any serious loss, although we cannot say as much for the one microfarad condenser which was formerly used on some systems of 'ring through' party lines. It is not very often that a condenser becomes bridged across a talking circuit, but when it does a very serious loss in both volume and clearness is the result.

"I have said that we do not often find a condenser bridged across the circuit, but we actually do have the equivalent of a small condenser bridged across every line, and it is the most serious transmission difficulty with which telephone engineers have had to contend.

"We found that a condenser consisted essentially of two conducting surfaces parallel to but insulated from each other. We have just that condition on every line, where the two wires parallel each other for their entire length.

"Compare, for example, the two circuits in this sketch (Fig. 74). Circuit (*a*) represents an alternating current generator connected to a condenser, and circuit (*b*) a telephone set connected to an open line. In (*a*) the charge and discharge of the condenser with every alternation of the current puts an actual load on the generator and involves the doing of work, or the expenditure of power. In (*b*) the condition is evidently the same, and a certain amount of the power generated by the set is used up in charging and discharging the two sides of the line, which act as the plates of a condenser. If, instead of the line being open, we put a receiver at the farther end, the set will probably be able to generate enough power to operate the receiver; but the impulses, in traveling over the line, must charge the line to their own potential before they can reach the receiver, and a portion of their energy will evidently be used up in doing this, resulting in a smaller current at the end of the line than at the starting point. The capacity of the line, then, acts as a shunt, and with a current of a uniform frequency we can consider the loss as being practically the same as a shunting loss.

"Unfortunately for telephone transmission, the currents which transmit speech are very far from having a uniform frequency, and in order to understand how capacity affects transmission we must find out just how its action is affected by the frequency.

"We have found that in order to charge a condenser to a certain potential we must force a certain amount of electricity into it. Suppose we compare the amount of electricity in each impulse of two alternating currents of equal potential, one having a frequency of 500 and the other 1,000. In the one case each impulse lasts 1/1000 of a second and in the other 1/2000, or only half as long. It is evident that—assuming the resistance of the circuit to be the same—each impulse of the higher frequency contains only half as much electricity as an impulse of the lower frequency. Applying this to a telephone line, since a definite amount of the electricity in each impulse is used up in charging the line, it follows that the shunting loss is twice as great with the higher frequency as it is with the lower. At our last meeting we found that a speech wave is made up of a number of widely differing frequencies, and clear transmission evidently requires that the form of the wave be the same at the receiving end that it is at the sending end. But if the higher frequencies suffer more from the shunting loss due to line capacity than do the lower frequencies, it is equally evident that with a high capacity line this requirement is not fulfilled, and that at the receiving end the wave has lost a considerable proportion of its high frequency components and consequently has a very different form from what it had when it started. The sound reproduced in the receiver, then, will be very different from that spoken into the transmitter, and in fact under these conditions we find that the speech is muffled and indistinct. We can understand very faint speech provided it is clear, but muffled and indistinct speech, even though it may be loud. is only an aggravation.

"We can see now why capacity produces a more serious loss than resistance, because while resistance reduces only the volume, capacity both reduces the volume and makes the speech indistinct. Furthermore, we can reduce the resistance loss at will by using more copper, but this only aggravates the capacity loss by increasing the surface of the wires. We can also see why cable brings in an enormously greater loss than open wire, because in cable the wires are necessarily very much closer together, and consequently have a much greater capacity.

"It might be interesting to compare in a general

way the losses due to various types of line. In the case of open wire it is necessary to use a fairly large size to avoid frequent breakages, and this keeps the resistance within reasonable limits except on very long lines, even when iron is used. The resistance of iron, by the way, is about six times as great as that of copper. To prevent the wires from swinging together they must be spaced several inches apart, and this keeps the capacity down. When a line is several hundred miles in length it is customary to use number eight copper, which causes a comparatively low resistance loss. Since the space on the poles is limited, however, we cannot increase the separation indefinitely, and so capacity ultimately becomes the limiting factor. The Chicago-New York line, for example, which was opened up in 1893, stood for many years as the utmost limit at which it was possible to hold a satisfactory conversation, because of its high capacity; and it was only when means were found to neutralize that capacity that longer distances became practicable.

"In the early days open wires were brought clear to the office, and line losses were almost negligible. As the wires grew more numerous, it became necessary to bunch them into cables, but these cables at first extended only from the office to open wire routes near by. As the business increased we had to extend the cables farther and farther, and line losses first became serious. I think you will see the point if you compare the spacing between wires on crossarms with the spacing in a cable, as affecting the capacity, and the difference in the size of the wire used, as affecting the resistance. To make matters worse, we had to contend with the fact that if we use any insulation other than air the capacity is increased materially, and at that time it was thought necessary to fill the cable with paraffine or something similar to keep out moisture. It was only when the bold step was taken of using porous dry paper for insulation and depending entirely on a lead sheath to keep it dry that it became possible to talk for any considerable distance through a cable. In one respect the early cables were more efficient than those we are using now, because space was not so important and the porous paper was wrapped very loosely, giving practically an air insulation and a fairly good separation between the wires. Now it is necessary to crowd as many wires as possible into one sheath, and this means tighter wrapping, closer spacing, and a correspondingly higher capacity loss. The same consideration has led to an extensive use of 22 gauge wire instead of the 18 or 19 gauge of the earlier cables, and this, of course, has increased the resistance loss.

"Aside from apparatus inefficiency, then, there are four sources of transmission loss—shunt, self induction, resistance and capacity. What are we going to do about them? None of them can wholly be avoided, but they can and must be minimized. Where a shunt is due to low insulation the remedy is obvious. Where it is due to necessary signaling devices the loss can be made almost negligible by making those devices with as high a self induction as possible, so that their impedance to the high frequency voice currents will be great.

"A self induction loss is usually caused by a relay looped in series with the talking circuit. Such relays are necessary for supervision, and the inevitable loss in them can be brought down to a very low point by bridging them with a properly designed non-inductive shunt or a condenser.

"The remedy for a resistance loss we have found to be the use of a larger wire, or the substitution of copper for iron. We sometimes hear the suggestion of doubling up the conductors on a long subscriber's line to improve the transmission, but while this halves the resistance it doubles the capacity, and therefore leaves us as badly off as we were to start with. When it is a question of supplying more current for signaling or talking, however, this procedure is legitimate.

Now for capacity, the most serious problem of all and the last to receive an adequate solution. We cannot say that it is fully solved even yet, because while we can now talk over open wires from the Atlantic to the Pacific, through subscriber's cables the length of Chicago, and—perhaps most wonderful of all—through toll cables 200 miles in length, we cannot yet talk across the ocean.

"This has been accomplished, first of all, by keeping the capacity as low as possible. The porous paper wrapping which insulates the conductors in a cable gives practically an air insulation, and in toll cables the wrapping is loose and the spacing wide. The real answer to the problem, however—so far as it has been solved—is the use of the loading coil, which was one of the greatest epoch-making discoveries in the history of telephony. You know it is first-rate politics to get two of your enemies to fighting each other, and that is what we do in using loading coils. So far we have considered self induction merely as a source of loss, but it has been found that by properly distributing self induction over a line we can, to a considerable extent, balance or neutralize the effects of capacity. Just how it works is a good deal of a mathematical problem, and it is too late to start anything like that tonight, but perhaps the analogy which first made me think I really knew something about loading may be of interest.

"When I was a boy I went to a school located on the Mississippi, and, as you all know, that river goes on more or less of a rampage every spring. It is a sight worth seeing as it floods the lowlands and carries away trees and all kinds of rubbish. We will suppose that the bank has caved in at some point and a lot of rubbish has started on its way to the Gulf. If we follow that rubbish we will find that while it started out together, after a few miles it has become scattered over a considerable distance. Part of it has floated to the middle of the stream and gone on with the full speed of the current, while part has been caught in the eddies along shore and been delayed. If we throw a dam across the stream we can hold up the first part until the rest has time to catch up with it. By that time the pressure on the dam has become too great, it gives way, the stream goes through with a rush, and the rubbish goes with it, together as when it started.

"Now, to apply this simile to a telephone line. Part of the impulse which carries the speech goes over the line at the normal rate, while part remains behind in charging the capacity of the line. When the impulse has passed a given point of the line that portion of it which was used in setting up this charge flows out after it, lagging after the original impulse. We have found that self induction opposes either a rise or a fall in the current passing through it, and so if we loop a coil having considerable self induction in series with the line we can hold up the original impulse until the other has time to catch up with it. By that time the current has become established through the coil, and the self induction tends to keep it from dying away. This aids in drawing all of the original impulse from the preceding section of the line, and so the impulse goes on to the next

section, together again in practically the same form as when it started.

"An explanation which is, perhaps, more commonly given, but which, to my mind, does not explain very much, is to say that self induction and capacity affect an alternating current in exactly opposite ways—which is perfectly true—and that, therefore, by combining them in a circuit we can make them neutralize each other.

"Since the capacity which we wish to neutralize is uniformly distributed over the circuit a very obvious suggestion was that of distributing the self induction with equal uniformity by winding an iron tape around the wire for its entire length. This has been the subject of various patents, one of which was taken out several years ago by a very good friend of mine, and I am told that there are now two submarine cables between England and France, one loaded in the usual way with standard coils and the other having its conductors wound with iron tape. This gives an ideal oportunity for comparison under severe conditions, and I understand that while continuous loading has several advantages from a mechanical standpoint, it does not give as satisfactory results in transmission as the use of the coils."

"My pipe's out," announced the Repairman. "I move we adjourn and let this digest."

The motion was put and carried unanimously.

(To be continued.)

Calculation of the Strength of Electric Currents

Probably the most accurate method for the determination of the value of the strength of an electrical current in absolute measure is by means of the Rayleigh current balance, in which the current to be measured is passed in series through two parallel circular coils of unequal radii, one of which is suspended from the beam of a balance. The distance between the planes of the coils is varied until the force of attraction between the two coils is a maximum, and the value of the force is obtained by adding weights to the other arm of the balance until its equilibrium is restored. Since the maximum force obtainable depends on the ratio of the radii of the coils alone, and not on their individual dimensions, it is only necessary to determine further the ratio of the radii of the coils, and this may be done with great accuracy by electrical means.

The constant of the instrument, that is, the maximum force per unit current for the coils in question, has been obtained in the past by interpolation between values of the force, calculated for various assumed distances of the coils, in the neighborhood of the critical value for which the force is a maximum. For, although the general formulas of Maxwell and Nagaoka give the value of the force for any two given coils, at any assumed distance with great accuracy, no formula has been heretofore published for calculating at what distance the force becomes a maximum. To supply this lack there is derived in a paper just published by the Bureau of Standards, Department of Commerce, entitled, "The Calculation of the Maximum Force Between Two Parallel, Coaxial, Circular Currents," a formula which gives the critical distance as a function of the ratio of the radii. The latter part of the paper is devoted to the development of methods for facilitating the calculations. The formulas are illustrated by numerical examples and tables, and the new formulas are shown to give results in agreement with those derived by more indirect and laborious method of interpolation.

Copies of the publication, Scientific Paper No. 255, may be obtained on request of the Bureau of Standards, Washington, D. C.

What North Dakota's Commission Is Doing

Last winter the legislature of North Dakota passed a law putting the telephone business under the supervision of the Board of Railroad Commissioners. This law was passed after extended conferences between the legislative committee, the telephone people and the members of the railroad commission, with the result that a law generally satisfactory, and yet very comprehensive in its features of supervision, now governs this public utility. Prior to the passage of this legislation the telephone companies were practically free lances in North Dakota, and it is a novel thing for them to ask permission for doing this or that, and sometimes arbitrary ideas have been carried out on a company's initiative without considering the new statute.

One of these cases arose recently where a small country company took things in its own hands and decided to abrogate an agreement as to service and connections with a larger company, with the result that for a week or more telephone connection between several points was tied up, each of the companies concerned refusing to recede from its position. Naturally, complaints were made to the commission by the public with the result that, in the absence of a precedent, the commission ordered the old service restored at once pending a hearing, at which time an adjustment will be made of the business done ad interim, and within half an hour after the order had been telephoned the companies the lines were opened again for business.

Under this law the commission is given power to formulate systems of bookkeeping, reports, etc., and in all probability the systems put out by the Interstate Commerce Commission will prevail for the sake of uniformity. The matter of rates will soon be taken up by the board, as there are over 100 companies in the state with almost as many systems and rates for essentially the same kind of service. In many of the country lines business methods are sadly lacking, and this feature of the work will be given attention, to the end that adequate sums are set aside annually for depreciation and betterments, this with a view to general improvement of service in long distance transmission.

New York Automatic Sues to Use City Conduits

The Long Acre Electric Light and Power Company and the Public Service Telephone Company, of New York, have under way proceedings to compel the use of public conduits for the Strowger Automatic Telephone.

The franchise under which the right is asserted is the same as that under which the Long Acre Company successfully fought for the use of the conduits of the Consolidated Telegraph and Electrical Subway Company, controlled by the New York Edison Company. The telephone company hopes to obtain use of the conduits of the Empire City Subway Company, which is controlled by the New York Telephone Company.

Convention of Operators at Richmond, Indiana

Manager Bailey and Secretary Vivian Conduct a School

PREPARING young women for efficient housewives may seem a peculiar function of a telephone exchange, but that is exactly what is done. If you don't believe it, just ask Manager Bailey of the Home Telephone Company, or W. S. Vivian of Chicago, who addressed the hundred pretty operators who assembled at the school of instruction at Richmond, Indiana, on September 4. No sooner does a young woman become proficient at the switchboard than she has received an offer of a better position and suspects they had better begin looking for someone else to take her place. This announcement is almost invariably accompanied by blushes and a sudden attack of self-consciousness on the part of the left hand.

Satisfactory service at the switchboard requires a pleasing voice, courteous manners, an inexhaustible store of patience, tact and an ability to act quickly in emergencies without losing courage. Young men perceiving these attractive characteristics in the young woman immediately make a headlong rush to sign a contract for life service under such an operator.

Mr. Vivian did not blame the young men, but said the desirability of the long distance girls made life one continual worry for the employers and the chief operators.

The girls, in their informal luncheon at Cliff Dale club, dropped a number of suggestions which might prove interesting to patrons of the wires if they knew that the operators can tell the true character by the voice that vibrates over the wires to them and by the manner in which receivers are banged on hooks.

Speculation as to the personal appearance of users of the telephone is an interesting diversion. The operator not only has to be a regular information bureau, but often overhears conversations which might cause trouble if known generally.

The girls' sense of honor and of duty to patrons who trust the company lead them to guard accidentally overheard remarks as confidential, and it is rarely if ever that business or pleasure transacted over the long distance or local telephone becomes a matter of gossip because of the operator's tongue.

The girls and their employers are coming to realize more and more that special training and exchanges of ideas are beneficial in improving service. The school which was held was one of a series which are being conducted for operators in eastern Indiana and western Ohio. The young women who visited Richmond held business sessions in the morning and afternoon and were guests of the Home Telephone Company at Cliff Dale Auto club for luncheon, after which they were taken in automobiles for a sight-seeing trip through the beautiful Quaker City.

* * *

Contrary to an opinion which prevailed a few years ago, the modern telephone girl is not a flirt. True, there are lots of impertinent young men who take advantage of her by calling central and trying to engage in conversation with the voice which replies, but they meet rebuffs.

The operator sees and hears of a side of life known only to those familiar with the underworld, that exists in every city of any size. She sees the traps which flirting leads a girl into, and she warily sidesteps them by refusing to indulge in that pastime.

The picture shows the alert, intelligent crowd of operators who attended the school, assembled on the steps of the Cliff Dale Auto club.

* * *

"Operator, I forgot to tell you I want the charges reversed on that talk I just had with Indianapolis."

Such a remark causes approximately $25,000 worth of property to be held up for several minutes. Or, when you call a person at Dayton and then do not respond immediately after your person is on the line, you are holding up about $15,000 worth of property for a 25-cent conversation.

Patrons do not know it, and the long-distance operators of independent companies who do not realize it were impressed with the fact during the meeting.

William H. Bailey, manager of the Richmond Home Telephone Company, made the arrangements, with W. S. Vivian of Chicago, secretary of the National Independent Telephone association, who has been holding schools in various Indiana cities for long-distance operators, relative to a date in this city.

At Winchester last month there were forty chief operators, some coming from Toledo, Dayton, Lima and other cities.

"It's worth it," Manager Bailey said. "The operators talk to each other over long-distance lines and often something arises which causes ridiculous little fights. Our operators here and the operators at Indianapolis each thought the others had horns and were the meanest persons on earth. They met at the Indian-

Girls Attending the Operators' Convention at Richmond, Ind., Last Month.

apolis meeting and are now good friends. When the operators know each other the service is bound to be better."

Miss Stella McGreevey, chief operator, is enthusiastic over the meetings, having attended two of them. Miss Marie Peters also attended the Winchester meeting.

"We are getting a chance to meet people with a common interest," Miss McGreevey said. "I believe the long-distance service will be benefited. Of course, we like to meet face to face the operators we talk to every few days. We learn to read people by their voices—more that way than by their faces. It seems to become instinctive with us to learn people that way, but at the same time we like to meet each other and talk together."

Although difficulties encountered by long-distance operators are many, the two chief ones, Miss McGreevey said, are the impatience of the patrons and their unwillingness to wait at the telephone until their calls are returned.

"Often when we have calls where three or four lines must be used to complete the circuit, and we had put the calls through, the man will have gone back into his factory or will have left his office, and it takes ten or fifteen minutes extra to complete the call," Miss McGreevey explained.

"When patrons forget to tell us to reverse charges before they talk, we have to go to the same trouble of connecting our lines again as if there would be another conversation. Then the operator at the other end has to get the approval of the other party before a reverse charge ticket can be made. Sometimes this causes no end of trouble."

Public Utility Commission News

Reports Concerning the Activities of State Regulating Bodies in the Telephone Field

New Jersey

THE city commission of Trenton has decided to defer action on Mayor Donnelly's resolution, asking the Public Utility Commission to establish a new telephone rate for service given in this district by the Bell Telephone Company.

A resolution was introduced calling for a revision downward of telephone tariffs, but it was decided to wait until a full board was present to continue the fight in the interest of the subscribers of the company.

The resolution calls for a rate of $2.50 for individual line service and proportionate tariffs for party lines.

While the telephone rental question was being discussed, Commissioner Fell said that he understood that aside from boosting rates for telephones here, as was announced by the company, for certain of its subscribers, a proposition was being considered to also establish a limited service. Under this plan a subscriber is entitled to a designated number of calls at an assessed rate. Calls in excess of the number are paid for additionally.

A resolution was adopted authorizing the city treasurer to borrow $50,000 in anticipation of the collection of the 1915 taxes.

A date has been set by the Public Utility Commission to consider the question of approving the sale of the Inter-State Telephone Company and its various subsidiaries to the Bell Telephone Company. The matter was to have been taken up by the board at its session in Newark, but an adjournment was asked until the matter could be looked into.

The action of the assistant attorney general followed a letter of complaint by George Meyers, one of the stockholders of the Paterson & Passaic Telephone Company, which also comes up for final action before the board. Meyers contends that the Court of Chancery was without power to confirm the sale of the Paterson & Passaic Company until it had been passed upon by the utility board. The Inter-State sale being in the same position as that of the Paterson & Passaic, the entire matter was put down for a hearing at the state house tomorrow morning.

The Board of Public Utility Commissioners has approved the application of the Delaware and Atlantic Telegraph and Telephone Company for permission to transfer on its books 47,285 shares of the capital stock of the Bell Telephone Company of Pennsylvania to the New York Telephone Company.

The result of this action on the part of the utility board will be to centralize the management for all the Bell Telephone interests in New Jersey. The stock transferred totals $4,728,500.

The system now operated by the Delaware and Atlantic Telegraph and Telephone Company in New Jersey has developed by the Bell Telephone Company of Pennsylvania. For the expenditure thus involved the latter company reimbursed itself with the stock of the former and now holds practically all shares.

Up to two years ago the Delaware and Atlantic Company also operated a telephone system in Northern Delaware. There, as in New Jersey, it was backed by the Pennsylvania company. Following a suggestion by the State Board of Utility Commissioners of New Jersey, the Pennsylvania company disposed of its holdings in the Delaware and Atlantic to the Diamond State Telephone Company, which thus became the sole operating company in Delaware. This left the Delaware and Atlantic Telegraph and Telephone company with New Jersey as its only field of operation. The result of placing the Bell telephone system in Delaware in the hands of one company is said to have been an entire success and also to have been one of the leading factors in the project to bring about a unification of management of the Bell system of the state.

The result of the action of the utility board will be that the entire Bell system in New Jersey will be operated from New York. As it is now the system in the northern part of the state is operated from New York and the system in the southern part from Philadelphia. All arrangements have been made for this plan.

Michigan

After a conference between officials of the Michigan State Telephone Company, Detroit officials and the State Railroad Commission, it was authorized to

proceed with the appraisal of the company's property in the metropolitan telephone district which the city will use in contesting the petition of the company for a readjustment of rates and the installation of certain metered service.

Notwithstanding protests from the telephone company, the railroad commission gave silent sanction to the plan of appraising the company's property in the metropolitan district on a basis of its valuation July 1, 1915.

The company filed its first application for a readjustment of rates and installation of certain metered service in 1914. At that time an appraisal of its property was made by the company, showing its value July 1, 1914.

As depreciation will figure largely in the city's appraisal, the difference of one year in the dates of the city's estimate and the company's estimate of the value of the property is deemed to be of great importance. An allowance for depreciation of the physical property in the last year will reduce the company's valuation of a year ago. On the other hand, its real estate has increased in value, creating another opportunity for a difference of opinion.

There are three things to be considered in the appraisal—the value of the property, its revenue and the expenses of operation.

The work will proceed until a recognized disagreement occurs between the company and the city's appraiser. Then the railroad commission will send an expert to obtain information on the point at issue.

Minnesota

The first step in an attempt to compel connection of competing telephone lines under the law passed by the last legislature, which places telephone companies under the jurisdiction of the State Railroad and Warehouse Commission, has been taken by the city of Owatonna.

In a petition filed with the commission the council declares that physical connection between the Tri-State and Telegraph Company toll lines and the Northwestern Telephone Exchange Company's local exchange is a public need.

The companies are given twenty days in which to file an answer to the complaint. The law places the burden of proof on telephone companies to show cause why physical connection should or should not be made. When answer is filed the commission will set a date for the hearing, and if it is found that physical connection of the lines is a public necessity an order compelling the connection will be issued.

The outcome of the case will establish a precedent that will affect many other towns and cities in the state.

For more than fifteen years the bill placing telephone companies under the jurisdiction of the Ralroad and Warehouse Commission came up for consideration at each session of the legislature. Several times the measure, fathered by Representative Frank E. Minnette, passed one house only to meet defeat in the other house. Two years ago it reached Governor Eberhart, who vetoed it.

Near the end of the last session the measure passed both houses after some of its objectionable features had been eliminated and was signed by Governor Hammond.

Washington

In a sweeping order made immediately effective the Washington Public Service Commission, as a result of a hearing recently held, forbids the 159 telephone companies doing business in the state to collect deposits from subscribers, and requires the refunding within twenty days of all deposits now held.

The Bell Telephone companies in the state now hold $58,000 of subscribers' money and while accurate figures are not available on the other companies it is estimated that the total amount to be refunded subscribers under the order will exceed $100,000.

While losing in their contention that they ought to be allowed to exact deposits before installing service, the companies win under the commission's decision in regard to the method they have used in collecting subscribers' bills.

Following are the complete rules as adopted by the commission:

No cash deposit or other security for installation of instruments, for the payment of accounts for local exchange service or long distance service points within the state of Washington or for any other purpose shall be required of any telephone subscriber (other than a city or town) owning, operating or managing any telephone line or part of telephone line or part of telephone lines used for the conduct of the business of affording telephonic communication for hire within the state of Washington: provided, that deposit may be required for any local or long distance call originating at a pay station.

The company may disconnect any telephone, private exchange or other instrumentality, device or apparatus of any subscriber and discontinue such subscriber's service on or after the expiration of ten days from the date on which any account for local exchange service or long distance service becomes due and payable (in advance or otherwise) when any such account remains unpaid after the expiration of ten days from such date. Any telephone company may exact from any subscriber two months' rental in advance at the time of ordering service, such charge in no case to exceed $5.

If the service charge ordered shall exceed the sum of $5 per month, the patrons shall pay from month to month in advance. If the service charge shall not exceed the sum of $5, the portion not absorbed in the first month's rental shall be applied on the succeeding month's rental, and the patron shall thereafter pay from month to month in advance.

No advance payment shall be exacted from the patron of the company on account of change of residence or telephone.

A complaint has been filed with the Public Service Commission asking for physical connection between separate telephone companies doing business in Port Townsend. At the present time he says that subscribers of one company cannot communicate with subscribers of another line without being subscribers to both. The concerns are the Pacific Telephone & Telegraph Company, the Northwestern Long Distance Company and the Citizens' Independent Telephone Company.

Wisconsin

For six years no action to relieve the people of Milwaukee and Wisconsin from the exactions of the telephone monopoly has been taken by the Wisconsin Railroad Commission, says a Milwaukee newspaper.

The complete failure of regulation of public utility companies in Wisconsin is shown by the record in this case. The Wisconsin Railroad Commission, August 8, 1909, declared in its ruling in the "Marinette case," that the items of 4½ per cent paid annually to the American Telegraph Company is "too high." Since

that time payments of approximately $178,000 annually, amounting altogether to more than $1,000,000, have been made for this single item, this amount being contributed by telephone users in Wisconsin. Milwaukee's share of this tax is $66,000 annually.

Five years ago complaint against excessive telephone rates was filed in the Bogard case. Hearing in this action began June 15, 1915. At the conclusion of the hearing Attorney E. T. Hibbard, representing the petitioners, demanded that the commission issue an injunction against further payments by the Wisconsin Telephone Company to the A. T. and T. Company. Claim was made by Hibbard that the hearing had established that these payments were extortionate and illegal and the cause of excessive telephone rates.

Such an injunction was denied by the commission. A letter dated July 7 from the commission to Hibbard said that body was then at work on a decision in the case and expect it will be out before long.

Brief on behalf of the city in the Bogard case was filed July 31. Since that time nothing has been heard from the commission. Attorneys for the telephone company have not filed their brief.

Telephone users in Milwaukee and Wisconsin are continuing to pay rates which are based on charges which the Wisconsin Commission declared six years ago too high. Under the public utilities act the Wisconsin commission is given authority to act on its own motion for the purpose of enforcing reasonable rates of securing adequate service. Yet nothing has been done.

Similar commissions in other states have not been so inactive. In a ruling made October 9, 1913, the California Railroad Commission declared that the payment to the American Telegraph and Telephone Company by the Pacific Telephone Company of 4½ per cent was excessive and reduced it to 2½ per cent, a saving of nearly half.

The Georgia commission, September 8, 1914, also disapproves of the 4½ per cent payment as excessive, holding that it enables the telephone "trust" to make a profit out of itself.

This commission also disapproves of the company's disablity and pension fund being allowed as a part of the valuation of the plant for rate making purposes because this enables the company to transfer the burden of caring for its employes to the public. Similar objection to this item is made by Attorney Schoetz in the Bogard case.

The Vermont Public Service Commission and a joint committee of the New York senate and assembly have also held that payments made to the American Telegraph and Telephone Company by its subsidiary companies, of which the Wisconsin Telephone Company is one, are excessive.

Notwithstanding its own opinion in addition to all the testimony showing that telephone rates in Wisconsin are based upon excessive charges collected by the parent company from the Wisconsin Telephone Company, the Wisconsin Railroad Commission continues inactive.

California

The Pacific Telephone and Telegraph Company has placed its rates and business methods before the California State Railroad Commission in a formal application asking the commission to make a thorough scrutiny thereof and afterward to make any changes which it might deem just and equitable in order that its rates may apply with uniformity throughout the state.

The application sets forth that the company's property in California forms an integral part of its telephone and telegraph system in Oregon, Washington, Nevada, Idaho and reaches practically every locality in California. It explains that all the company's property in the state is operated as a part of its entire system, and as each exchange is not a separate entity but a part of the system, it would neither be practicable nor fair to it or to its subscribers for the commission, in determining the rates to apply in any one exchange, to consider only the property of that exchange, but the commission should estimate the value of the whole California system as a unit.

Wyoming

The first exercise of its authority to compel public utilities to render good service made by the new Wyoming Public Service Commission was a warning to the Belle Fourche and Northern Telephone Company that unless it improved its service between Moorcroft and Sundance before September 15 a rival concern would be authorized to construct a parallel line. The commission's action resulted from J. C. Noble's application for permission to operate a rival line, because of the alleged poor service afforded by the Belle Fourche and Northern Telephone Company.

West Virginia

While Wheeling has been in favor of the merger of the Bell and Independent telephone companies throughout the state, there are some cities and towns within the boundaries of West Virginia that believe that they are being hoodwinked. In the circumstances, therefore, the Public Service Commission will hear their objections relative to a merger.

The cities and towns of the state which find objections to the merger claim that the people now find themselves confronted with one-company telephone system, and as it is proposed to regulate rates in each center on its own basis of patronage, there is considerable interest on what action, first, the telephone company will take, then what action the public service commission will take in the approval or disapproval of the tariffs applied for.

Since the citizens now know that there is only one company, many, it is believed, will insist on renting only one telephone instead of two, and in having service from the one company adequate to the charges. If the rates are established at figures which the various boards of trade and business organizations consider exorbitant, the cities and towns will carry their objections to the public service commission, and this makes it appear that a long and hard fight is staged for the future, before the Bell Telephone Company will be able to carry out its present plans.

Pennsylvania

The Blairsville Telephone Company complained to the commission that it was unable to secure the approval of the Johnstown Telephone Company and the Windber Telephone Company to connections between the lines of the complainant and the respondents by

means of which the subscribers of the complainant could communicate over the lines of the Johnstown Telephone Company with subscribers of the Windber Telephone Company. The complaint filed asked that the commission direct the respondents to make the connections between the lines of the various companies under the provisions of the public service company law.

It appears from the testimony that the Blairsville Telephone Company's lines are connected with the lines of the Johnstown Telephone Company, and that this company's lines in turn connect with those of the Windber Telephone Company, and also that the Johnstown Telephone Company was willing to make the connections asked for, but that the Windber Telephone Company had refused to do so for the reason that its subscribers were already connected with the Blairsville district by means of the connection between the Windber Telephone Company and the Bell Telephone Company. It also developed that the Somerset Telephone Company, through its connection with the Johnstown Telephone Company, was able to communicate with the subscribers of the Windber Telephone Company, but there was no evidence that the circumstances and conditions governing the service in the Somerset Telephone Company's locality were the same as those in the Blairsville Telephone Company's locality.

The prayer of the petition was refused by the commission for the reason that the Windber Telephone Company already had connection with the Blairsville locality, and that there was no evidence to show that the service rendered by this connection was not adequate. It was also held that there was no evidence of discrimination in the practice of allowing the connections between the Somerset Telephone Company, the Johnstown Telephone Company and the Windber Telephone Company.

Ohio

Before the Ohio State Public Utilities Commission, Judge Allen Andrews, of Hamilton, made an argument on behalf of the petition of the Hamilton Home Telephone Company. The prayer of the petition is that the Hamilton Home Telephone Company, an independent concern, may be attached to the Cincinnati and Suburban Bell Telephone Company. He claims authority is vested in the commission to order a physical connection and exchange of service between the two companies. The question in various forms has been raised before officials since the public utilities act was passed in 1911. Previous holdings have been unfavorable to the petition.

The Ohio State Public Utilities Commission will be asked to decide whether or not the rates charged for telephone service in Elyria are fair and reasonable.

This was decided at a meeting of the city council, when a resolution was passed authorizing an action before the commission at Columbus with a view, if possible, to get cheaper telephone service.

It was stated to the council that the Elyria Telephone Company is now earning a profit on the capital invested exceeding 40 per cent and that within the past year the stockholders have received a dividend of about 100 per cent.

The resolution passed by the council also authorized the city solicitor to prepare suitable legislation to be presented to the council to force the telephone companies to remove their poles from the streets in the business section of the city and to put their wires in conduits underground.

Councilman Jones at first objected to the resolution on the ground that he wanted an opportunity to investigate the matter further before voting upon it.

The result was that a motion to suspend the rules was lost, Rawson, Stolzenburg, Fowls, Theman and Beck voting "aye" and Jones and Sudro voted "no."

The solicitor then explained that the resolution was simply to permit the public utilities commission to decide as to the fairness of the rates now in force and was in no sense final and binding on the council.

Jones stated that he was not objecting to this section of the resolution, but to that relative to forcing the removal of telephone poles from the streets.

The solicitor then called his attention to the fact that the resolution only authorized the preparation of legislation which the council might later accept or reject as it should deem the wisest course to adopt.

Jones then withdrew his objection and the resolution was passed on suspension of the rules without a dissenting vote.

Through the renewal of the effort of the Hamilton Home Telephone Company, Hamilton, Ohio, to get long-distance connection with the Cincinnati and Suburban Bell Telephone Company, by petition to the Ohio State Public Utilities Commission to order physical connection, the question of the construction of the provision of the act of 1911 regulating telephones is to be tested in the Ohio Supreme court. Whichever side loses in the latest contest will take the case to the court on appeal.

Nebraska

The Lincoln Telephone Company, of Lincoln, has appealed from the decision of the Nebraska State Railway Commission, according to Attorney-General Reed a non-existent body, in the Sterling telephone case. The Lincoln company will carry the case to the Supreme court. The commission held that it had no authority to forbid the establishment of the People's Telephone Company, in the territory already served by the Lincoln company.

The Nebraska Railway Commission has issued an order adjusting telephone rates at the town of Valparaiso, which means an increase of rates for those companies which attempted to build lines in competition with old established telephone lines and make money by charging less than are charged by the old companies.

The fact was disclosed that the Valparaiso Telephone Company has just put in a new metallic service and can not make anything by charging the old rates. So the Railway Commission issued an order, prepared by H. G. Taylor, granting consent to the company to increase its new metallic service rates to $2.50 for an individual business telephone and $1.50 for an individual residence telephone.

The Engineer Awakes

Address Before the American Association of Engineers, Chicago, September 14, 1915

BY PROF. F. H. NEWELL

NOW IS the day of awakening of the engineer as a man and as a citizen to a larger realization of his duty to society in general, to his profession, and to himself in particular. He is not alone in this. The world-wide war has shocked into life many dormant conceptions and has opened the eyes of mankind to the larger claims of brotherhood. The horrors of the destruction of life and property and the ruthlessness with which the accumulations of centuries and the hopes of the future have been sacrificed is bringing about a reaction and is preparing the way for the growth of a larger human consciousness. The engineers in this peaceful country are not unaffected. Their occupation in a large part has been reduced and as a result they have been afforded time and need for thinking on these vital matters. They are getting fully awake to their part in the world's progress.

There is nothing really new in this awakening, except perhaps in the greater intensity and vigor of the accumulated forces at work. Life with its rhythmic character is a constant series of awakenings; we remain quiescent or sleep until hunger sharpens the appetite and forces a clearer realization of surrounding conditions. This is literally true at the present time. The hunger or threatened hunger of large numbers of professional men is causing them to note more keenly their surroundings and their relations to each other and to the public.

More than this, the present century is that of organization. The zeal for the study of efficiency, the demand for larger and more effective organizations, the value of preparedness, all of these are being forced on the attention of the thinking man; he is seeing as never before the need of organization and of sacrificing of some of his individuality in the interest of work for and with his neighbor.

What distinguishes an engineer? Before going further into details of this awakening, it may be wise to inquire what we mean when we speak of the engineer. It is a word in common use, but few of us can agree upon a definition. We ride on the railroad train; everyone knows who mwe mean when we speak about the engineer of the train, and yet in the present talk we do not consider this man as necessarily belonging to the engineering profession. Our lives depend largely upon his faithfulness to duty, his intelligence and his skill; no man ranks higher in public confidence than the locomotive engineers who are safely carrying each day millions of passengers. In our present discussion, however, we have in mind not the engineer who operates an engine, nor the mechanic, however skilled he may be, but rather the man, who may be a mechanic or engine-runner, but who is essentially something more. What is that quality which we are endeavoring to include in the term engineer as generally used?

The quality which distinguishes the engineer as a professional man from his brother the mechanic is education. The engineer is undoubtedly benefited if at the same time he is a good mechanic, although he may be a success even if he has little or no mechanical ability. To be an engineer in the true sense, he must have, however, that education which enables him to understand the true perspective of things, to know the big from the little, to obtain facts and judge correctly from these facts.

Why should he serve? The education of the engineer, whether obtained through books or through things, has been largely at the expense of some other person—either society, the state or his more immediate employers. If he is a graduate of a university or an engineering school, the cost of his education, in part, at least, has been borne by the philanthropically endowed college or by taxes levied directly or indirectly for the support of a state institution. If he is not a college graduate his early education has been more largely at the expense of his parents and to a less degree at that of his employer. It is assumed usually that in the case of an employer he has returned value received, but most of the older engineers will testify that they have usually made large investments in educating young and untrained men from whom they have not always received a full return. However this may be, it is safe to say that the majority of engineers are indebted to some one for the opportunities which they enjoy; as a body they owe a duty to the state and to society as well as to their profession.

ETHICS.

It is this recognition of duty which gives rise to the ethics of the engineering profession and which distinguishes the engineer as a professional man from the ordinary mechanic, who, from lack of this education, does not feel bound to the same degree by written or unwritten codes. These ethics are well recognized, although, like many other matters of common knowledge, they are often difficult of exact definition. We know when they have been violated and yet may debate long as to the exact line between ethical and unethical conduct. The conception of engineering ethics is fundamental to the profession, and finds its highest expression in *service*.

Service to the public and to the engineering profession by means of service to the members should be the motto of any organization of engineers.

SERVICE.

What is this service which all should be eager to render and which is the fruition of years of training? What do we mean when we claim that the highest function of the engineer and his greatest reward is found in effective service? The word conveys the idea of help rendered to another, not as a favor involving an obligation, nor on the other hand as a matter of self-sacrifice. It is something which may be expected though it can not be demanded, and may be performed among equals. Service consists of those acts which tend to lessen trouble or increase the health, prosperity and convenience of others.

Engineers in performing service are by this very fact entitled to full recognition. Service implies a suitable reward, and while the effort may be altruistic, it does not involve unnecessary self-denial. A proper remuneration, one assuring a good living, is due to the engineer. He who performs service rightfully does it with full expectation of reward, directly or indirectly in the satisfaction of duty well done.

In every age and climate men have felt the impulse to be of service to their fellow men. This has been

manifested in innumerable ways, ranging from an intense religious enthusiasm, shown by a desire to convert all men to their way of thinking, or to the perfection of codes of laws designed to elevate mankind. The attempt during the early ages was to reach the ultimate by some short path; to convert the heathen by a rigorous campaign at once. In later years, however, we have come to recognize that the improvement of the human race as a whole must necessarily be slow; we are more content to take shorter steps, with consequent surer progress. Thus, the altruistic motives of the present generation are characterized by intense practicability. Much of the energy which in olden times might have been devoted to the task of saving men's souls is now expended in saving their digestion; in so doing the ultimate saving of their souls may be made easier.

One of the more recent manifestations of this altruistic spirit has been in the so-called conservation movement—initiated largely by engineers—essentially an appeal to patriotism, characterized by love of mankind and having a deep religious significance. Other manifestations are in the rapidly increasing number of movements for civic betterment, for better farming, better schools and better homes made possible by the study of domestic economy. All of these are manifestations of the desire to be of service, to promote the public welfare, to lift man out of ignorance and poverty to a point where with the enjoyment of larger physical comforts he will be better prepared to more fully utilize his better qualities.

ENGINEERING SERVICE.

Among all the various ocupations there is none which is more capable of leading in service to mankind and in realizing higher ideals than the engineering. The engineer should be a man of vision—a missionary of light and progress. His life is devoted to careful, impartial measurement and weighing of facts. He can not afford to be deceived or to mislead others on these facts; having ascertained them in their true proportion, it is then his business to idealize, to plan and to use his ingenuity in devising methods for adding to the comfort and convenience of mankind, such, for example, as through better conditions of transportation, of communication, of heating, lighting, water supply and of the things which tend to produce better health and longer life in the community.

HAMPERED BY IGNORANCE.

In this work the engineer is far ahead of the public. The latter in many ways has not yet caught up with the growth of knowledge and does not appreciate the possibilities which are awaiting realization under the magic touch of the skilled engineer. The people as a whole do not as yet have the vision of better things which lie within their grasp, and which can be called into being when ignorance is dispelled. Many a community is existing or even declining because it does not utilize the available water supply or have constructed the needed sewerage system. The more progressive people and the young men are leaving to go to localities where these better things are accomplished.

The public is not wholly to blame. The engineer in part is, to a certain extent, culpable. He has not fully felt the need of diffusion of information, except among his professional brothers. He has not taken the public into his confidence and explained in simple terms, in ways that would attract the public, the results already achieved, nor has he given these a setting or application such that the ordinary citizen and tax payer can comprehend how this work affects him or how his condition may be improved. The farmer continues during his lifetime to drive up and down the hills, wasting time and effort because the engineer has never brought home to him that it is practicable at moderate cost to improve the grades as well as the surface of the roads.

NUMBER OF ENGINEERS.

Without attempting to discriminate very nicely between the different classes of men who may be considered as engineers, it is safe to assume that there are in North America over 100,000 men whom we would class as "engineers" outside of the purely mechanical occupations. Of these over 40,000 are members of approximately 100 organizations. The greater part of this number is included in four great national societies, the membership of which in round numbers is as follows:

American Society of Civil Engineers	7,700
American Society of Mechanical Engineers	6,100
American Institute of Mining Engineers	5,000
American Institute of Electrical Engineers	7,750
	26,550

The above total of 26,550 includes many duplications, particularly of names of the more prominent engineers, as they are usually members of two or more of these larger national societies. It is safe to assume that there are at least 20,000 engineers, embracing most of the men who have become leaders in the profession, included in the membership above noted.

These organizations have their headquarters in New York City, three of them in the Engineering Societies Building (29 West 39th street), the headquarters also of a number of small organizations. Many efforts have been made toward co-operation among these and at one time it was hoped that all four societies would come together under one roof. It is still possible that such results may be accomplished. There are certain advantages to be derived from physical contact, even though there may be no organic connection. Progress has been made to some extent at least by the formation of a Society of Technical Association Secretaries by which means a certain unity of action may be produced on matters of common interest.

The organizations next in point of size are the Engineers' Society of Western Pennsylvania with headquarters at Pittsburgh, 1,150 members, and the Western Society of Engineers, with office in Chicago, 1,200 members; next the Associated Engineering Society of St. Louis with 800.

The hundred or more local engineering societies organized at the principal centers of population have a membership each of from 100 or less up to 500 or more, averaging about 200. The importance of these societies has not been fully appreciated, even by their members, and the most enthusiastic will hardly claim that they are as yet fulfilling their largest or best function. They have in one sense boundless opportunities for useful work if only they can grasp them.

The total membership of these local societies aggregates in round numbers 20,000, so that for the purpose of discussion we may say that of the 100,000 men who claim the right to be called engineers, 20,000 are members of the four national societies with headquarters at New York; about an equal number, including many of the above, are members of local societies, leaving over 60,000 of the men not enrolled in any engineering organization.

In this great group are many men of ability and standing in the profession, but who have never seen the

necessity of joining with their fellows in organized efforts. By far the greater part, however, are the younger or less prosperous men who are performing routine work in engineering offices or engaged in the details of the country surveyor and engineer. As a whole, they include the more poorly paid professional men whose compensation averages less probably than that of the high grade mechanics. We do not have any definite data on this point but those who have employed engineers and graduates of engineering schools are aware of the fact that under present conditions, at least, we can obtain the service of highly educated skilled engineers, as computers, draftsmen, office or field assistants, at a nominal wage.

It is not the "submerged tenth" but the six-tenths for whom special appeal should be made to ascertain whether their condition may not be improved by applying to it painstaking study to ascertain the true facts and to provide a remedy as should be done by the engineer to meet and overcome physical obstacles. If we can solve some of the great problems of control of electrical current, of storage of floods, of winning coal and iron from the earth, of devising ingenius mechanism, we should be able by using the same degree of intelligence to materially improve the human machinery. We have, however, in the past often overlooked the things which lie nearest to us while going to the unsettled west, or to the ends of the earth, to attempt tasks more remote.

STILL MORE ENGINEERS.

To this large body of engineers there is being added each year about 5,000 recruits, mainly from the engineering colleges, more or less well trained in the fundamentals of engineering. There was a time within recent years when there was demand for every one of these young men in active engineering work. At present, however, it is necessary that many of them go into other lines. It is not to be supposed that their education is by any means wasted, as the training of a good engineering college is probably the most valuable to be had, in preparing young men for their life work in lines of trade and commerce. While during the first few years they may not receive salaries as high as those of other men of their age who have gone into business directly from the common schools, yet in the long run the training they have acquired gives them opportunities for more rapid substantial progress.

One of the problems that are now confronting us is the fact that each year this large group of graduates, as well as the thousands of young men employed in engineering offices, is coming into a profession apparently overcrowded. This overcrowding, however, is more apparent than real. A relief is to be obtained not by limiting the influx of men, but rather by widening the field of service.

OPPORTUNITY.

The field is practically unlimited, the bounds extending with every improvement in the conditions favorable to human health, comfort and industry. Artificial limits, the cramping efforts of which we now appreciate, are set solely by ignorance. They exist only in the mind, and arise because of lack of knowledge by the public in general and of individuals in particular. To put it in another way, if every taxpayer and voter in the country, every town, city, county and state officer was fully aware of the conditions which surround him, and the extent to which the engineer could remedy or improve these conditions, there would be an immediate demand for all the engineers who could be found. Take, for example, the matter of road building. The public has been slowly educated toward the needs of good roads, but not so fully to the fact that to build these good roads a certain amount of skill and experience is needed. We have the spectacle, surprising in a country which prides itself on its good sense, of millions of dollars being spent on new roads and in improving old roads, often without any preliminary survey or study of correct location or preparation of plans and estimates, nor of adequate supervision of the work, even if well planned.

The amount of money which is being wasted today in the amateur efforts of elected officers, who will be replaced next year by men no better qualified, would furnish employment to a great part of the engineers in the country. The point to be observed, however, is not that we are arguing for the employment of these men, but that the claim is based upon the far more substantial grounds of benefit to the public and to the man who pays the bill.

Take the matter also of public health. Imagine for a moment that every local official was aware of the conditions which are affecting the health of his community and of his family, and that he knew that these conditions could be remedied by intelligent and skillful engineers, and moreover that the cost of this work would be far less than the extravagant waste of time and money now taking place because of preventable sickness and death; would he not at once set about employing the man who could save not merely the money values, but what is far more precious, the happiness and lives of his own kind?

The opportunities are boundless—they stand on every hand ready for us when we awake. Listen! opportunity speaks!

"They do me wrong who say I come no more
When once I knock and fail to find you in,
For every day I stand outside your door
And bid you wake, and rise and fight and win!"

SALESMANSHIP.

Properly to seize the opportunity the engineer who rises to the occasion must cultivate some of the qualities summed up in the term *salesmanship*. We recognize that the success of many a merchant is due to a peculiar art which he has acquired and one which enables him to sell goods at a profit. We have more slowly come to recognize the fact that his success is due, not to the fact that he personally makes a profit, but that the other party, the world to whom he sells, is benefited. It is true that for a time the merchant may sell inferior goods and may temporarily make money by so doing, but in the long run he has learned that the established business can only rest secure on honest advertising and on the realization by the public that he is performing a real service to mankind.

In the same way, the engineer, to succeed, must acquire the art of salesmanship. He may not recognize or label the quality and may even deny its existence. He points to the code of ethics rigidly observed against advertising or self-exploitation, and yet while conscientiously observing all proper rules of ethics, he may possess to a high degree the real art of presenting his wares in such a way as to convince the world that the general welfare is promoted by purchasing from him.

He has for sale, not boots and shoes or legal opinions, but what is more difficult of delivery, he has ingenius but true ideals, he has imagination, trained by years of study and practice. He has acquired the power of making these "dreams come true," in proportion that the public or his employer recognizes these qualities, to that degree is he able to sell his wares. There is, perhaps, nothing more instructive to the young engineer

than to try to ascertain the methods of salesmanship which have led to the recognition of cerain well-known and respected engineers. Some have succeeded through or in spite of extreme modesty and a reticence which has been hard to break through; but in each case there has been not only true value of the goods to be delivered, but some quality of mind or action which has impressed upon others the fact that the goods are of superior value.

PARALLEL LINE OF ACTIVITY.

In the preceding pages there have been very sketchily outlined the opportunities for service and an indication given of the great body of men who are available for such service to the community—one for which they are entitled to proper reward. In what has been said, it is apparent that there are difficulties to be met. In the present awakening innumerable schemes have been suggested for action but most of these fall under one or another of two principal lines.

First, co-ordination and co-operation of existing engineering societies and organizations.

Second, formation of one or more new associations devoted almost exclusively to the material welfare of the engineers.

These movements are the natural outgrowth of the discussion and unrest which has prevailed. They are not antagonistic and may be mutually helpful. Not all men think alike and the path which will be attractive to one group is not to another.

In establishing a new movement or society the burden of proof of the need of such organization is upon the promoters. If it is proposed to assume new costs and create new obligations, it must be clearly shown that there exists not only real need for this additional machinery, but that the public will be the gainer thereby. It is hardly to be expected under present conditions that any plans will be cordially received by the officials and by supporters of long established and tested societies. As a rule engineers are conservative. They prefer to trust to veterans in the cause rather than to new volunteers and, above all things, look for the efficiency and economy which comes from unity of action.

We can, therefore, hardly present too strongly the arguments for branching out on any new line. In what has been said, it may appear as though undue emphasis has been placed upon the public welfare and too little upon the benefit to the individual. It goes without saying that the individual must be convinced that he has much to gain in entering upon a new movement, but at the same time we must not lose sight of the fact that no such movement as is now discussed can be successful unless it is firmly founded on the public welfare. This may sound a strange doctrine to those who have not given thought to the matter; it is the popular conception that every business man is looking out for himself and that his success is based upon purely selfish considerations and that every organization must do likewise.

If we go deeply, we find that in a free country no volunteer organization can long exist which is founded on purely selfish motives. The public does not long deal with the merchant who does not give fair bargains and it does not look with favor upon any body of men brought together for confessedly selfish ends. If, therefore, any movement should be so unfortunate as to start with the handicap of popular misconception that it is devoted solely to the financial gain of its members, the future history would likely be short and stormy. For this reason the benefits kept prominently in view should be those not of individuals, but of society as a whole.

Summing up the needs and opportunities, it appears that a great part of the main body of engineers is not fully employed to the best advantage to society and to themselves, with corresponding loss to all. Nearly two-thirds of those who may properly call themselves engineers, or, perhaps, 60,000 men, are not members of any well-recognized organization, and are not utilizing their potential strength to help themselves or each other. There is need of enlightenment, of raising ideals and of united effort toward better things. The existing engineering organizations, which include, perhaps, 40,000 men, are devoted almost exclusively to technical questions as distinct from those things which concern the engineer as an individual and a citizen. Few of the older societies attempt to bring in the rank and file of the profession, or attempt to cover the field of the new American Association of Engineers, in its efforts to help and reach the masses of the profession.

PRESENT PROGRAM.

The program already laid out by the American Association of Engineers is so inclusive that it is hardly possible to comment briefly upon it. It is founded on the solid basis of proposing primarily to raise the standard of ethics of the engineering profession and to protect the economical and social affairs of engineers.

Ethics, as already defined, result in effective service and in the recognition of the duty which every engineer owes to his fellow men. Any code of ethics is merely a re-statement of "the golden rule" to do unto others as you would have them do unto you.

The promotion of the economical and social welfare of engineers involves a broad program as wide almost as that growing out of the practical application of a standard of ethics or living up to the golden rule. Their welfare is tied up with that of the society in which they live and begins with aid to that society accompanied by recognition on the part of the society in general of the proper reward for services performed.

FIVE CHANNELS.

It is proposed to carry out the broad program above outlined through five specific channels.

A. The first of these is by affording means for the interchange of information this being vital to all of the functions.

B. The second channel is that of maintaining a service clearing house. There is probably no one matter in which the engineers as a whole are so deficient as in those things which pertain to employment. The engineering colleges are graduating hundreds of young men into a profession apparently overcrowded. Each employer is besieged with applications. There has probably never been a time when so many competent engineers were out of work. There are innumerable employment agencies and some of the larger engineering societies have undertaken in more or less mechanical way the diffusion of information concerning employment. There is, however, no systematic treatment of the subject such as is creditable to a body of men of the high intelligence of engineers.

It should be possible for the engineers of the country to study the whole question of employment and to devise a system which will obviate much of the wasted time and effort. Every day lost by a man hunting a job is not merely a loss to him but is a greater loss to the community. This loss consists not merely of his wages but more than this of the valuable results which flow from his employment. There is thus no one question presented to the engineers as a whole which is more

important to the individuals and to the society at large than this of attempting to solve the employment problem.

C. The third line for raising the ethics and the welfare of engineers is within a relatively new field, that having to do with patents. It is really one of the branches of law in which the engineer has been conspicuously weak. It might well be expanded to cover other similar legal relations with the public.

D. The fourth item is one of peculiar delicacy and one whose importance is only equalled by the dangers involved. The moment that any body of citizens organize not as citizens, but as a distinct class of professional men and begin to enter upon the domain of law making, they become an object of suspicion. This should not be so, but nevertheless we can not shut our eyes to the fact that every one of us has a feeling of uneasiness as to the political activity of doctors, lawyers or ministers working as such avowedly for their own benefit as professional men. There is no doubt but what there has been great neglect of duty in the line of education or of diffusion of information to the members of the law-making bodies. As citizens, all engineers have a duty to perform, but when organized too great care cannot be taken to have it clearly understood that engineers acting together are concerned not immediately for their own personal benefit as a class, but are performing a service for the public.

E. The fifth line, that of proper publicity, is really the all-inclusive activity in that it involves and brings about most of the aims before noted. Publicity means turning in the sunlight, dispelling the darkness of ignorance and driving away the shades of half truth. The full and proper diffusion of information results in a wide increase of work, brings about liberal employment, aids in serving as a guide to the engineer in all his work for the public while at the same time giving the public a proper appreciation of the work performed.

CONFIDENCE.

For success in these movements there must be not only a high purpose with energy, enthusiasm and devotion on the part of all concerned, but more than this all actions taken must be such as to maintain full confidence on the part of the public in the purity of the motives inspiring the men who are leading. There is nothing which so quickly destroys as a suspicion that self-interest is at the bottom. No movement has been of permanent value which is not founded on intelligent altruism. It is true that occasionally men have organized and succeeded for a time by a more or less indirect use of force, but such success is temporary, unless it has joined with it a recognition by the public that a broad benefit is being conferred upon all.

Confidence is inspired by full publicity, by avoiding any appearance of secrecy and by keeping all action open to the full light of day.

THE FUTURE.

Assuming that the great mass of engineers are now awakening to a full appreciation of their opportunities, there is every reason to suppose that with the use of their united intelligence an early and sure progress can be made. We can not at once overcome all of the inertia of the past, but with a wider diffusion of information, we may confidently look forward to a rapidly widening field of work and a larger appreciation of results to be attained. If we could only comprehend the power for good that exists in the united effort of this great body of intelligent, experienced men, we could see that nothing can withstand their efforts. Properly directed, they may bring about in the near future even greater progress than in the past in the promotion of general welfare by the development of new industries, the creation of new means of communication, as well as the improvement of those now existing to a point where the dreams of the most optimistic have become solid facts.

Telephone Efficient for Dispatching

Additional testimony, tending to show the growing use of the telephone over the telegraph in the dispatching of trains, has been adduced before Railroad Commissioner Max Thelen at the hearing on the applications of the railroads of the state for the relief from the provisions of the new law requiring a train dispatcher at every siding.

The Santa Fe's case was put in recently and the cases of the other roads will follow. Witnesses examined testified as to their experience in the dispatching of trains by telephone, and said it was excellent.

The point was brought out by the railroads that letters had been received from nearly every railroad in the United States showing that all of them were using the telephone system in the same measure as it was used by California roads, and that if the California railroads should turn the telephone system down it would be setting a precedent for the entire country.

"The Remuneration of Engineers"

Editor TELEPHONE ENGINEER.—In your editorial, "The Remuneration of Engineers," appearing in the September number of TELEPHONE ENGINEER, you propound the question: "How can the engineer overcome the condition that makes possible such a pronounced underpayment for services?" You quote an excerpt of another editorial which suggests as a remedy that engineers should seek to obtain a reputation by personal publicity (writing for technical magazines) and taking an interest in public affairs. I believe that the answer is in publicity, but in publicity of a different kind. The kind that will count is the kind that goes to educate the public to the proper understanding of what the engineer really is. By such a method a reputation is gained for the profession rather than for individual members of it.

The character of a profession and the esteem in which it is held by the general public is determined by its code of ethics and standards of fitness which measure the effectiveness of its members in rendering public service. The effectiveness of men is governed by the course of training they have undertaken. The course of training of the engineer is of such nature that he is well fitted to undertake responsibility and assume authority in public affairs.

That the general public has not a clear understanding of this fact is the fault of the engineer himself. It has been said that he has the art of self-abnegation reduced to a science. Because the profession is what it is in itself, some few members of it have attained a measure of prominence. They could not dodge it. But in every case the individual is given the credit and not the profession. It is for those who have not been so providentially blessed to gather together and by united effort see that credit falls where it is due—to the profession.

Now, we come to the answer for the whole situation—and that is organization. It required organization to place the professions of law and medicine on the high plane they now hold. It will take organization to do it for the engineer. There have been organizations from time to time, but these have always been within the profession—the employe against the employer. Such organizations do not and cannot live. Unions are meant for trades. For a profession they defeat their own ends.

What is needed is an organization that will first look to it that members of the profession have high ideals of ethics, responsibility and public service, and then go about educating the public to the appreciation that such a condition exists. Through that procedure, and no other, will the engineer ultimately come into his own.

O. F. GAYTON.

[EDITOR'S NOTE: Judging from literature received in this office the American Association of Engineers, 29 South La Salle Street, Chicago, seems to be trying to cover such an organization as is mentioned above.]

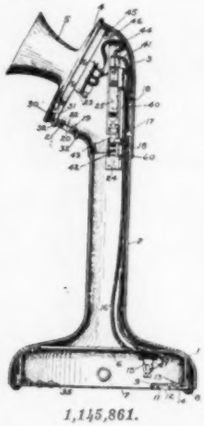
Telephone Patents Issued in August

A Brief Digest of those Current Specifications Most Interesting to Telephone Men

BY DAVID S. HULFISH

PATENT No. 1,144,997. Semi-Automatic Telephone System. Issued to A. M. Bullard, assignor to Western Electric Company, Chicago, Ill. In a keyboard for a central office operator for semi-automatic system, two call senders are provided, and any set of number keys may be connected to either of the call senders. The arrangement permits a second call to be started before the first has been completed.

1,045,109. Automatic System. Issued to J. L. Wright,



1,145,861.

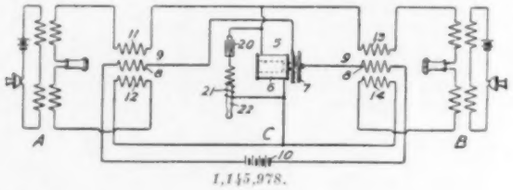
assignor or Frederick C. Stevens, Attica, N. Y. The line relays are grouped, and the group has an auxiliary relay. Current to any line charges both the line relay and the group relay, identifying first the group and then the line. The selector answering the line selects first the group and then the line.

1,145,120. Automatic System. Issued to E. E. Clement, assignor to Frederick C. Stevens, Attica, N. Y. Details for working of lines between a central exchange of the semi-automatic type and branch exchanges having only automatic equipment, all calls passing through the central controlling exchange.

1,145,245. Trunking System. Issued to Morton L. Johnson, assignor to Frank B. Cook Company, Chicago, Ill. When a manual operator listens upon an order circuit, an automatic switch selects a trunk, and an audible signal, variant for all trunks, identifies the trunk to the operators.

1,145,542, 1,145,543 and 1,145,544. Call Senders. Issued to J. G. Blessing, assignor to Automatic Electric Company, Chicago, Ill. Call senders of the button-bank type, suitable for semi-automatic or automatic exchanges.

1,145,659. Party-Line System. Issued to Otto Asmussen, Brooklyn, N. Y. A selector is placed at each station of a party line or private line. Currents from any controlling station operate the selector of the controlling station and of the other stations successively, operating to select the de-



1,145,978.

sired station and to set intermediate stations to lock-out position. A second battery sets the two stations to speaking position.

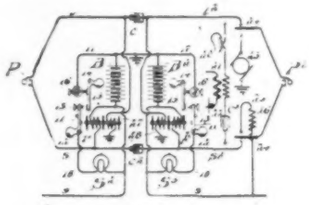
1,145,861. Desk Stand. Issued to W. W. Dean, assignor to Garford Manufacturing Company, Elyria, Ohio. The style of construction of the desk stand is novel, and the claims of the patent read upon the mechanical arrangement of parts. The transmitter case attaches to the column of the stand without a knuckle joint.

1,145,976. Supervisory System. Issued to W. W. Dean, assignor to Kellogg Switchboard and Supply Company, Chicago, Ill. (Application filed June 15, 1903.) A supervisory relay is partially charged to light a lamp and fully charged to extinguish the lamp, the relay armature having three positions.

1,145,978. Repeater System. Issued to Herbert G. Dorsey, assignor to Western Electric Company, New York, N. Y. Tuning devices, of capacity and inductance, render the speech relay less efficient at certain frequencies, to prevent singing in the repeater.

1,146,002. Trunking System. Issued to Edmund Land, assignor to Kellogg Switchboard & Supply Company, Chicago, Ill. (Application filed November 25, 1904.) The system includes manual cord pairs and an automatic selector between the calling plug and the subscriber's line, as in a toll board calling through an automatic exchange. The claims pertain to the release circuit for the automatic switch.

1,146,074. Semi-Automatic Exchange. Issued to Mor-

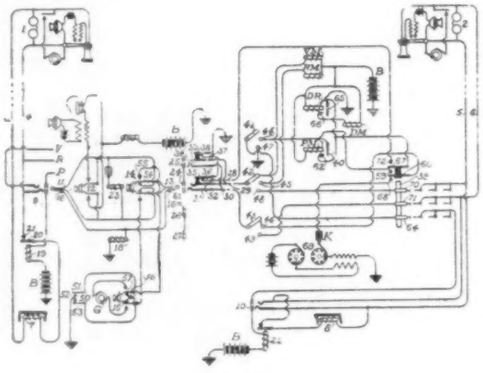


1,145,976.

ton L. Johnson, assignor to Frank B. Cook Company, Chicago, Ill. The calling line is connected automatically with an operator, after which the operator selects appropriate automatic switches and adjusts them to the called line. All operations are electromagnetic and largely in the control of the operator, and automatic interference features are provided.

1,146,177. Trunking System. Issued to Edmund Land, assignor to Kellogg Switchboard & Supply Company, Chicago, Ill. (Application filed February 13, 1905.) The trunk extends from a manual jack through an automatic switch. The claims are 117 in number and include circuit arrangements for releasing and restoring the automatic switches.

1,146,583. Automatic System. Issued to F. R. McBerty, assignor to Western Electric Company, New York, N. Y.



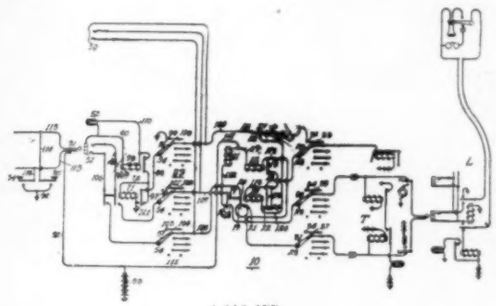
1,146,062.

The central office has registers for recording the number called, the selecting switches being adjusted from the registers rather than directly from the telephone which is calling. This patent first associates a register equipment with a calling line and then connects a selecting equipment with the calling line.

1,146,786. Call Sender. Issued to B. M. Davis, assignor to Automatic Electric Company, Chicago, Ill. (Application filed March 5, 1908.) The signal is sent as the dial is drawn

forward. The sending mechanism is restored upon being released by a slight backward movement of the dial. The dial wheel does not return.

1,146,821. Semi-Automatic System. Issued to Michael Schwartz, assignor to Automatic Electric Company, Chicago, Ill. At the operator's keyboard, the call sending de-



1,146,177.

vice is kept automatically always in engagement with an idle trunk line.

1,146,889. Line Switch. Issued to Frank A. Lundquist, assignor to Western Electric Company, New York, N. Y. A rotary switch associated with the line connects a calling line to a trunk, and a locking device then holds the engagemnet until releasing conditions are set up.

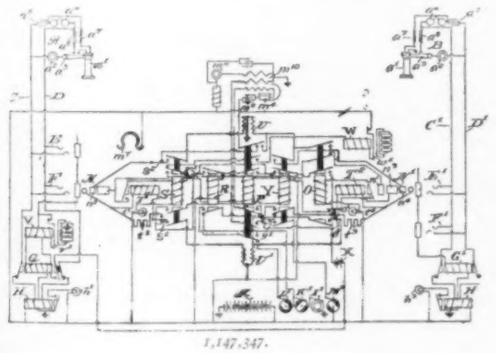
1,147,025. Semi-Automatic System. Issued to Morton L. Johnson, assignor to Frank B. Cook Company, Chicago, Ill. The calling lines operate automatic switches to select an idle operator. When two lines fall to the same operator's position, the second of them is held until the first has been answered. Signals are displayed until the operator answers.

1,147,246. Semi-Automatic System. Issued to Morton L. Johnson, assigner to Frank B. Cook Company, Chicago, Ill. A group of calling lines has associated with it switches for connecting a line to other lines and switches for connecting a line to an operator. When a line calls, one switch of each kind is connected to the line. The operator then connects calling and called lines by operating automatic switches, and leaves the connecting switches under control of the connected lines.

1,147,347. Meter System. Issued to H. S. Turner, San Diego, Cal. The meter winding is wired into circuit as the detector in a Wheatstone bridge, and its operation when desired is attained by throwing its associated bridge circuits out of balance.

1,147,389. Automatic System. Issued to C. L. Goodrum, assignor to Western Electric Company, New York, N Y. A line finder and a connector are arranged together. The claims are for the circuits of line relays and controlling relays for the two switches.

1,147,390. Automatic System. Issued to C. L. Goodrum, assignor to Western Electric Company, New York, N. Y. A line finder system. The vertical magnet is operated



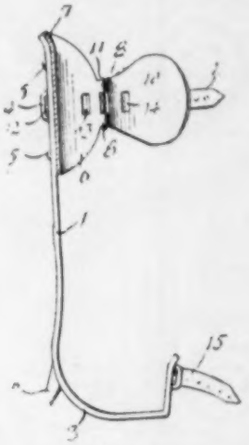
1,147,347.

until the level of the calling line is found and then the rotary operator. A starting circuit extends always to an idle line finder.

1,147,437. Call Sender. Issued to J. N. Reynolds, assignor to Western Electric Company, New York, N. Y. Ten push keys are shown. A wiper makes contact with ten points in one revolution. Depressing any key causes the wiper to revolve and isolates all the contacts not needed for the signal desired.

1,147,498. Split Insulator. Issued to E. H. Freeman, assignor to Trenton Porcelain Company, Trenton, N. J. The two parts of a porcelain insulator clamp the wire between

1,147,498.



1,147,609.

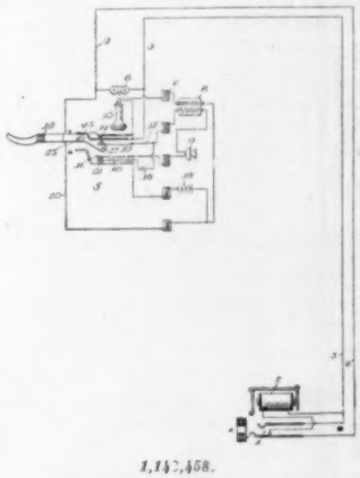
them. They have interlocking and aligning surfaces, and are alike, so that any two pieces in the bin will fit together.

1,147,609. Climber. Issued to J. B. Clark, Morgan City, La. The climbing spurs have broad plates at the top to engage the leg comfortably.

1,147,716. Automatic System. Issued to C. L. Goodrum, assignor to Western Electric Company, New York, N. Y. A system in which each selector is accompanied by a finder switch, and in which the release of each such pair operates to release the next succeeding similar pair.

1,147,753. Dry Battery. Issued to Leo J. Schatzel, Fostoria, Ohio, assignor of half to O. V. Maurer, Cleveland, Ohio. (Application filed December 19, 1910.) The depolarizing compound comprises a salt of persulphuric acid, such as potassium persulphate.

1,147,864. Automatic Searching Switch. Issued to David S. Hulfish, assignor to Canadian Independent Telephone Company, Ltd., Toronto, Canada. A double searching brush is shown, one part leading the other. When the leading part



1,147,458.

of the brush engages a contact which should stop the rotation of the switch, a relay operates to isolate the leading part and transfer the control to the lagging part of the brush, thus giving greater latitude of time and of angle in stopping the switch.

1,147,895. Manual Telephone System. Issued to Newton C. Schellenger, assignor to Kellogg Switchboard & Sup-

ply Company, Chicago, Ill. (Application filed February 24, 1903.) A supply bridge for battery current to the transmitters is provided, in which all of the talking current for each line passes through the associated supervisory and cut-off relays.

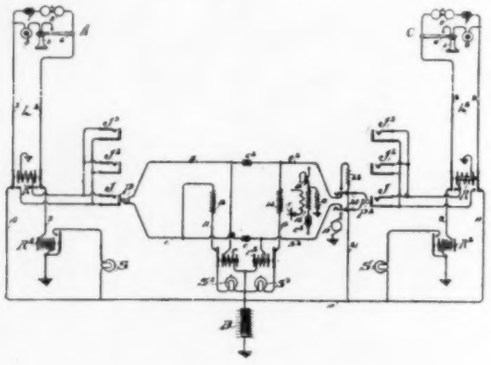
1,147,928. Automatic System. Issued to H. G. Dietl, Vienna, Austria-Hungary, assignor to Western Electric Company, Chicago, Ill. A single relay governs the release of an automatic switch, the relay being self-locking until the return of the switch to normal position.

1,147,997. Meter for Automatic Exchange. Issued to Fritz Aldendorff, Antwerp, Belgium, assignor to Western Electric Company, Chicago, Ill. Upon the party lines, a meter is provided for each party of the line, and upon the making of a call by any party the corresponding meter is so prepared for operation that it will be operated if the call be successfully terminated, and the remaining meters will not be operated in any case.

1,148,141 and 1,148,142. Train Telephones. Issued to E. H. Boudwin, Philadelphia, Pa., assignor of parts to D. W. Harner, R. L. Worsin, C. M. Gage, J. A. Pfouts and A. E. Yohn. Telephones are fitted in each car and in the locomotive, connection being made to the track, and connection between cars being made at the air-brake coupler.

1,148,152. Battery. Issued to Felippe Saboia Bandiena de Mello, Rio de Janeiro, Brazil. The depolarizer comprises oxysulfid of copper.

1,148,218. Battery Tester. Isued to E. L. Clark, assignor to National Carbon Company, Cleveland, Ohio. A device for testing dry cells. The critical current valve for the test will operate a relay to brake the main test circuit,



1,147,895.

thus indicating that the battery passes the test, yet preventing any heavy draught of current from the cell tested.

1,148,458. Telephone and Signal Circuit. Issued to O. M. Leich, assignor to Cracraft-Leich Electric Company, Genoa, Ill. A local-battery telephone has a transmitter battery and also an auxiliary battery for signaling to the exchange. As the hook rises, the two batteries are connected momentarily in series and to the line wires, to trip the switchboard drop.

Michigan Company Again Seeks Meter Service

The Michigan Bell Telephone Company has reopened its campaign for increased telephone rates, publishing a proposed new schedule of rates to be paid by subscribers and filing with the state railroad commission and the Detroit mayor's office copies of the schedule, statements of its earnings and expenses and its inventory and appraisal of property values.

The rate increases were sought a year and a half ago by the company, when it proposed to establish metered service, but the state railroad commission withheld its consent to any increases until the necessity for them was shown.

In response to a demand by the city that the company show its investment here in order to prove its right to an increase as a means of giving it a fair return, the company agreed to make a complete inventory. The company now has completed the assortment of facts that it hopes will convince the state railroad commission that it is entitled to get increased rates.

The revenue and expense statement accompanying the papers filed show the company's loss at $20,000.

Woman Operators in London for Night Duty

Hitherto it has been the practice to employ only male operators for night duty in the London telephone service, but it has now been decided to call in women operators for this purpose, owing to the large number of men who have enlisted for war service. They will be called upon, for four nights a week, to take up their duties at 8 P. M., and finish at 8 A. M., in conformity with the official schedule of 48 hours a week. Three hours out of the 12 are to be given for rest.

The necessity for the innovation is apparent when it is considered that out of the male staff of 1,500 as many as 440 have gone on active service. All these are paid their full salaries, less army allowances, and guaranteed their positions when they return.

Ten of the staff have been killed in the war, and in accordance with the arrangements made their dependents have received a year's salary.

Automatic Exchange in Norway

Plans and forms of tender are being prepared for the installation of the first station of an automatic telephone system in Christiania, Norway (see report published in Daily Consular and Trade Reports for March 17, 1914), the cost of which will be approximately 1,000,000 crowns ($268,000). It is estimated that improvements will involve the expenditure of 5,000,000 crowns ($1,340,000) within the next six years. Specifications and forms of tender can be procured as soon as completed by addressing Kristiania Telefonanlag, Toldbodgt 30, Christiania, Norway. All telephones in Norway are owned and operated by the government.

Government to Approve of Indiana Merger

The proposed consolidation of the Central Union and Delaware and Madison Counties Telephone Companies is now before the Department of Justice of the United States, is stated in a dispatch from Washington received today.

Department of Justice officials were sounded on the question as to whether or not they would object if the Central Union Telephone Company should take over the telephone plant at Anderson, Ind. The court has authorized the merger subject to the approval of the Department of Justice. The matter will be t aken under advisement.

According to the *Journal Télégraphique*, the longest line in Europe provided with Pupin loading coils is that between Stockholm and Lulea, 1,299½ km. in length. The Pupinised line between Berlin and Aix-la-Chapelle is almost 700 km. long.

A twelve-page pamphlet, or bulletin of portable testing sets and instruments for the maintenance of lines and cables, is published by the Queen-Gray Company.

European Telephone Development

Translations from the Foreign Press and Communications from European Engineers

BY FRED W. SCHOLZ

FOR many years various scientists have made experiments to find out what changes are made by various microphones in the sounds of human speech. The best known of these studios are those by Devaux-Charbonnel in 1908, those by Cohen and Sheppard in 1907 and by Bela Gati in 1911. Figs. 1 and 2 show the oldest of the oscillograph records obtained by Blondel and by Cohen and Sheppard. Devaux-Charbonnel has even tried the quantitative analysis of sounds by measuring on sound curves, magnified with great care, the amplitudes of the different harmonics. These results, without being identical with those found by other physicists who had worked through acoustic methods only, were not so very much different either as the following table shows:

Devaux-Charbonnel.		*Helmholtz.*	*Koenig.*	*Hermann.*	*Auerbach.*
O.....	{ 480 { 800	si... 471	si... 471	re... 598 mi... 652	la....435
A.....	{ 640 { 960	si... 942	si... 942	sol.. 756	fa....642
I.....	{ 320 { 2080	re...2380	si...3768	re...2380 sol..3024	fa....321

These various authors came to the conclusion, from their work, that the microphone curves which they obtained in their experiments were characteristic for these certain vowels, and later developments seemed to show that the oscillograms obtained with certain vowels when using definite types of microphones could be considered as characteristic for those microphones.

The authors who made these experiments which are here given in abstracted form also started out from this assumption. In a study on quite a different subject they were obliged to use the material compiled by previous

Fig. 1.—Vowel Oscillograms by Blondel.

physicists and were surprised to find that the vowel curves which they obtained did not agree at all with those of former experimenters. Consequently they thought it of importance to call the attention of physicists and those men who work in the telephone field to this fact and gave some of the oscillograms which they obtained in their research. The differences obtained in the curves might perhaps explain why words transmitted by microphones are not always faithful to the original and why every person possesses,

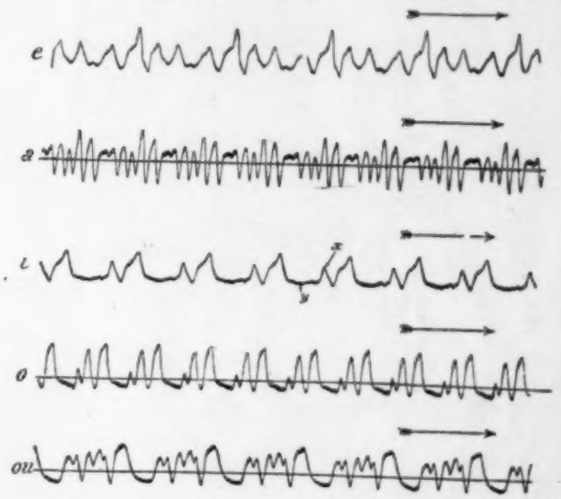


Fig. 2.—Vowel Oscillograms by Cohen and Sheppard.

aside from his ordinary voice, a voice which we might call the telephone voice.

For the experiments the authors, Messrs. Blondel and Polak, employed a triple bifilar oscillograph constructed by Blondel, using two bifilar wires to trace the curves obtained from the currents flowing through two microphones. The third bifilar was bridged over a tuning fork giving 200 double vibrations per second and allowing the frequencies of the sound waves to be registered. As sources of sound the authors employed the human voice, a bell, a special siren whistle and other instruments. The microphones were suspended by long wires in front of the source of sound, as shown in Fig. 3 and the truth of the curves obtained was verified by interchanging the microphones and the connections. To obtain the oscillograms shown in Fig. 3, the two bifilars were connected in series over one microphone of the type *P*. Reading the figure from left to right, they have grouped side by side four segments of successive oscillograms. The oscillogram No. 1 is one in which the current is zero; oscillogram No. 2 has the circuit closed and the current equal to 1/100 of an ampere passing through the two bifilars and the microphone; in No. 3 the vowel *a* is given in front of the microphone, and in No. 4 the vowel *i* is given. A simple inspection of the curves shows that the two bifilars register practically the same current sufficiently identical. As a matter of fact, when calculating the amplitudes of the different rises and falls composing the curves, it is seen that the curves are almost identical within ½ per cent, which is sufficiently accurate for our experiments.

After the accuracy of the curves had been obtained, various types of microphones were used for tests, the

same being designated by letters *P, D, B, H,* and *T*. These are microphones used in ordinary telephone instruments. They are all solid back microphones of metal, except *H*, which is of the granular microphone type. The *T* microphone is for submarine cable use. *P* is used for

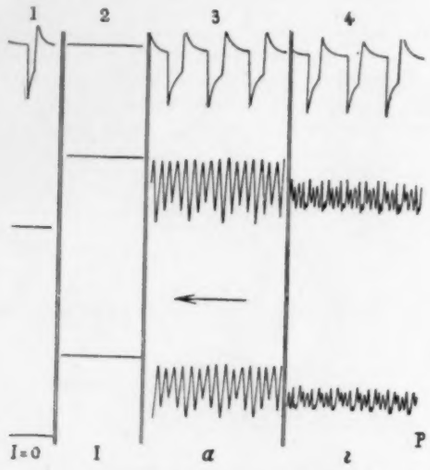


Fig. 3.—Comparison of Oscillograms 2 and 3 by Tracing the Curves Made by the Speaking of Vowels a and i.

long distance transmission work, *B* and *H* are also of the granular type.

Fig. 4 gives results with microphones *P* (above) and *D* (below) for the vowels e, i, o, u, ou. It is seen that the oscillograms give rather important changes, and that for all vowels, especially the vowels *i* and *u* the harmonics lie rather high. For the vowel *o* the microphone *D* gives a sound wave which might be called sinusoidal, of a frequency double that given by microphone *P*. The same changes were noted with all the other microphones studied, about a dozen. In Fig. 5 the oscillograms are reproduced as obtained for different vowels when spoken into microphones *B* (above) and *P* (below). Here a resistance of 400 ohms. was employed. The current flowing through the microphones was about 1/100 ampere. Here also the absence of the upper harmonics is notable.

In Fig. 6 (oscillogr. 35) we have the curves obtained when the two bifilars are connected in series with the microphones *B* and *P*. Oscillogr. 36 shows the same conditions but in the opposite direction. Finally No. 37 shows the curve traced by the ringing of a bell. As long as the sound wave is pure, the microphones register it without deformation, but the upper harmonics are deformed. The deformation of the upper harmonics is, therefore, a fault inherent to all microphones. To explain the origin of this fact, it is natural to attribute it to the resonance of the equipment used and it is then necessary to find out what the proper frequency for microphones is. To obtain this the authors worked in various ways.

For one experiment, they tried to find the period of free oscillations by subjecting the diaphragm of the microphone to a sudden strong pressure which would immediately cease; the microphone would then go on vibrating with its own vibrations. In this way the vibrations obtained by a pistol shot or by a sudden mechanical pressure were obtained. This latter pressure was obtained by the armature of an electromagnet and then destroyed instantly by breaking the current to the magnet. The results were, however, not of a nature yielding much chance for comparison. A better effect was obtained when employing a siren whistle giving forth in air or in water sound waves of frequencies ranging from 600 to 3,000. When the frequency given by this siren is equal to that of the microphone, it gives rise to a strong amplification in the oscillations due to resonance. It was found that, as a rule, microphones do not possess a clearly defined frequency, rather they have frequencies that vary within wide limits. For example microphone *B* had only one frequency of 2,400, while the microphone *P* had one of 1,000 and one of 2,000. The microphone *D* had a frequency of somewhat near 1,700, while microphone *H* had one of 2,400 and one of 2,000. The variations in changes given to sounds can be explained by the insufficient magnitude of the frequencies of the microphones used, by the excess or insufficiency of the damping effect of the microphones, or by the accidental resonance of the diaphragm for one or the other harmonic found in the sounds of speech.

Without trying at all to draw definite conclusions from these experiments, this study shows nevertheless that great care must be taken when using the results from oscillographic studies for practical telephone work. Telephone microphones can introduce oscillations of their own of frequencies quite different from those of human speech, every time that these microphones are not damped sufficiently. There are great differences between various types of microphones. The methods indicated in the tests could be employed, if further developed, to make extensive microphone tests. One of the best methods is perhaps that using the siren whistle, because this gives a fairly constant sound with a steady volume. It seems that the best method for studying the composition of vowels in telephone transmission would be the synthetic method, consisting in superimposing an electromotive force of harmonic terms produced by other smaller alternators, as for example, those made in the experiments by M. Cahill for the reproduction of sounds made by musical instruments. Only the vowels were studied by

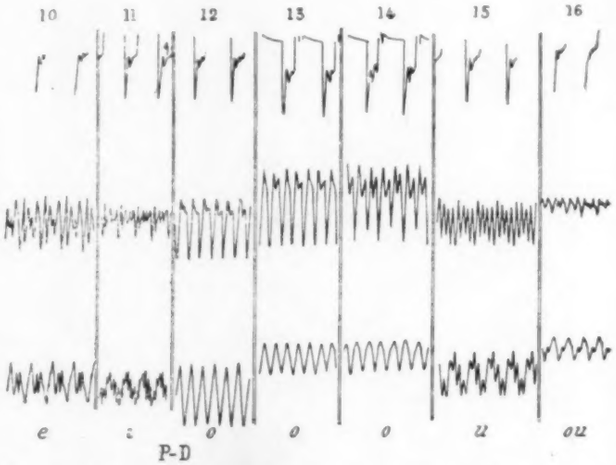


Fig. 4.—Comparison of Microphones P (Above) and D (Below) for the Vowels e, i, o, u, ou. The Upper Curve Is Given by the Tuning Fork.

the authors, as the consonants offer much greater difficulties, being more complex. The larger part of the latter, being called either explosives or fricatives, no doubt set in action the harmonics of the microphones and are, therefore, more subject to deformations than the vowels. They are moreover the sounds which the ear distin-

guishes least of all and which play the most important role in human speech transmission.—Blondel and Polak, *Journal des Telegraphes et Telephone.*

NON-INTERFERENCE PARTY LINES.

The system of party lines used in Austria and also introduced in France has four advantages: (1) Each of the subscribers can call the exchange without interfering with the other parties on the line. (2) The exchange can call any of the subscribers without troubling the other members on the line. (3) When the line is busy, whether it be on the part of the subscriber, or on the part of the exchange, no other party on the same line can interfere. (4) A subscriber can communicate with all the other subscribers on the telephone lines, regardless whether they are relayed or not relayed on the same circuit.

This system permits only four subscribers to be connected on the same party line and these are distinguished from each other by the numbers II, IV, VI, VIII. These numbers were chosen rather than 1, 2, 3, 4, because in both German and French the sounds of these four are so similar that the chance for confusion is great. The calls are made by the exchange in sending a direct current over one or the other wire with the return circuit by grounding and by changing the direction of the current. After six minutes of conversation an automatic registering apparatus disconnects the subscribers and gives the cut-off signal to the exchange operator. Another register indicates the total number of calls made by each subscriber on the party line. A battery with two elements is placed at each subscriber's telephone. Fig. 7a and 7b give the wiring diagrams for the connections made for subscriber 12-II who wishes to call 38-IV.

12-II calls the exchange by merely removing his receiver. The hook in going up closes the contact 1.3, which makes a current pass from *PA* to the calling relay *RA* and the relay *RP*, the contact *b* and then returns to the other pole of the storage battery through ground. The falling of the indicator disc of *RA* closes a local circuit which operates the cutoff relay *RC*, which latter immediately cuts off the battery supplying the call signal

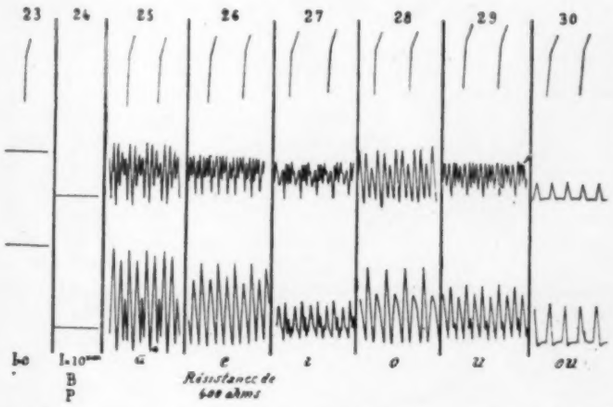


Fig. 5.—Comparison of Granular Microphone B (Above) With the Microphone B (Below), When the Circuit Contained 400 Ohms Added Resistance.

lamp. From now on the line is closed for any other subscriber. At the same time, however, the calling relay *RP* has let fall *V*, which under the effect of its weights, closes the contacts *r.s* and *t.u*, which is equivalent to placing a shunt between the telephone lines of the calling subscriber and the secondary *s* of the induction coil. (The contact *n.o* is normally closed.) This action would not take place if another subscriber were now to remove his receiver, since the battery *PA* is not in the circuit. When closing the conversation, the receiver hook closes the microphone circuit at *4.7* and cuts the contact *1.2*.

The telephone operator at the exchange now places

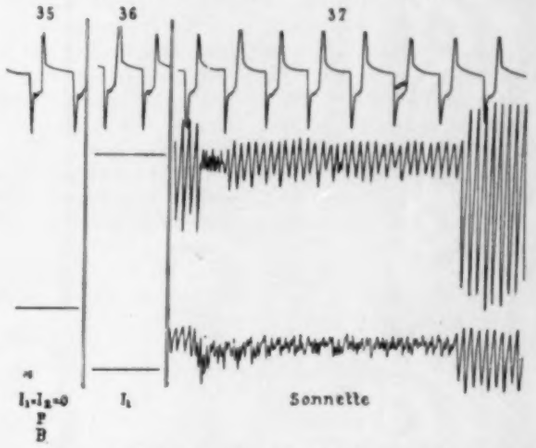


Fig. 6.—Comparison of Two Microphones P (Above) and B (Below) in the Reproduction of Sounds Given With Bells.

her answering plug into the jack No. 12 and returns the disc of her annunciator disc. The armature of relay *RC* has returned, but the calling current has been cut off by the jack. She then lowers her listening key, which passes the four springs *a, b, c, d* over their internal contacts and receives the call. She then places the calling plug of her double cord into jack No. 38. Then, in order to call subscriber 38.IV without using her listening key, she presses on button IV, which is grounded over wire L_1 and the negative pole of the calling battery over wire L_2. We have now: 1. All the relays *RD* are operated and grounding has taken place over all the contacts *c* of all the subscribers along line 38. 2. A current passes in the calling bell relays *RS* from telephones IV and VIII. 3. Only *RS*, IV is operated, for this one alone possesses the proper polarity.

We must now see what is going on at subscriber IV. The contacts *i, g, h* are closed by the calling bell relays. A shunt from the calling current passes the calling bells *S* and rings the telephone bell. The contact *g* closes the local battery circuit over a low resistance coil of relay *RS* whose armature remains closed even after the call from the exchange. When the call is ended, the armature *RD* returns at *b*, but *i, g, h* remain closed, and the grounded circuit is connected by the operation of the cut-off relay *RR*. We must now take two cases, depending whether the called subscriber answers or not.

He answers: The subscriber lifting his receiver from the hook closes 4.6 which has the same effect on *V* as seen before and at the end of the call 5.4 is opened and *RS* and later *RP* return to the rest position. Finally the hook closes *4.7* and opens *1.2*. The operator returns her listening key to the original position and all the parts of the line are at rest. When one of the callers hangs up his receiver, the hook closes *8.9* which makes a current pass from the grounded line of the caller's telephone, passing over *b, 8.9, n, o, t, u*, the wire L_2, the contact *c*, the low resistance coil of relay *RF*, the self induction coil *D* and finally returns to the insulated pole of the battery *PF*. The telephone operator will now merely remove the plugs from her jacks and break the connection.

The subscriber does not answer: If the second subscriber does not answer, the operator breaks the connection. If now the telephone were to remain in a position equal to the one when the call was made, there would be two inconveniences. 1. The local battery would still be connected to the local circuit and would be polarized. 2. At the moment when the subscriber would remove his receiver he would cause the fall of the annunciator disc *V* which would connect him probably into one of the conversations just going on. These two inconveniences have been avoided by using a cut-off relay *RR*, which works at the moment when the calling battery *PA* works, whose insulated pole has just been returned by wire L_1. It is clear that the entire set is returned to the rest position by the breaking of contact *f*. The current which passed over *RR* has made the annunciator disc drop and it is necessary to raise it again. In case two subscribers on the same party line wish to communicate, the operator removes the answering plug out of the jack and replaces it by the calling plug and proceeds as before.

It is now necessary to give some details as to the construction of the various elements in the party line system. The relay *RD* is used to ground the circuit in normal times by way of relays *RR* and *RP* and the contacts *8.9* and during the period of conversation over relay *RS*. If this were not the case, e. g. if *b* and *c* were grounded at the same time, during a call between II and IV, the calling and cut-off relays would be operated at the same time, which is out of the question. Moreover, if during the call of II or VI, a subscriber IV or VIII were to remove his receiver, the calling battery would be short circuited over the resistance of wire L_1 and over contact *1.3*. It is, therefore, essential that in removing the receiver, *1.3* should be always opened anew before *1.2* is opened. In order that the shunt relays *RD* should not have too much influence on the telephone currents, they are given a great resistance, about 4.000w. and 35 henrys.

We are now going to examine the necessity for the condensers K_1 and K_2 of the double cord and for the condenser *K* of the subscribers. Suppose subscriber 12-II has asked for 38-IV and the operator has called the latter and has placed her listening key in the rest position. Then 12-II is ready to talk and 38-IV has the contacts *i, g, h* closed a current passes from the battery, over the low resistance coil of the clearing relay, the contact *c*, then the line L_2 of 38 and the four shunt relays of subscriber 38, then the cut-off relay *RR* of 38-IV and back to earth; this current is not sufficient, however, to influence the cut-off and the clearing relays. If, however, K_1 and K_2 on the one side and *K* on the other side were not there, other currents would come from the clearing battery, would pass over the high resistance clearing coil and would pass over *d* and the wire L_1 and would then join the currents in relays *RR* of 38-IV; *K*, however, stops them. On the other hand, a current starting out from the clearing battery, would pass over the low resistance coil, would pass over *a*, then the wire L_2 of line 12, would try to return over L_1 by way of telephone 12-II and the shunt relays 12-IV, 12-VI and 12-VIII; then would pass over *b* and would return over L_1 from 38, if K_2 did not stop them. All these currents would then act in conjunction on the clearing relay on the one side and the cut-off relay of 38-IV on the other side. It is necessary that a subscriber cannot give the final cut-off signal, while another subscriber is still talking; it is for this reason that the currents from the clearing battery pass by way of contacts closed by the fall of the disc.

A few words should be said concerning the registering device which is to limit the conversation time to 6 minutes. The dial makes a complete circuit in that time. When this circuit has been made, the end is given automatically by the closing of *o, p*, but at the same time *n, o* is opened and *m, n* closed. This last precaution, which consists in short circuiting the subscribers, has been taken to make further listening over the wires impossible, which would be possible owing to the capacity of the line; *o, p* does not remain closed, for this would introduce over L_2 a permanent grounded circuit, in case the subscriber did not hang up his receiver. When the subscriber hangs up his receiver, the lowering of the hook returns the time counter to the original position.

It is also possible to announce the short circuiting by means of the two springs of the calling jack. Without this precaution, the subscriber II would be called every time that L_2 is grounded; it is clear that if the calling battery were connected only to the springs corresponding to L_1, the shunt relays would be operated, in case of grounding of current by way of L_2, and the subscriber II would be called, since the polarity of his calling bell is just right. This trouble would also appear in the case where, one subscriber having already hung up, the operator at the exchange would disconnect, without the other subscriber hanging up, since we know that the hanging up of the receiver in itself grounds the circuit by way of L_2. The use of large resistance coils for the clearing relays has for its purpose the giving of clearing signals by means of alternating current by the subscribers. The resistance was made great in order to avoid shunting of telephone circuits.

The readings in Fig. 7a and 7b are as follows: *RA*—calling relay, 500 w.; *RC*—cut-off relay, 80 w.; *RN*—nightbell relay, 4 w.; *RF*—clearing relay, low resistance, 200 w.; large resistance, 800 w.; *D*—self induction coil, 150 w.; *PA*—calling battery, 60 volt; *PS*—battery for bell (2 elements); *PF*—battery for clearing signal, 16 volt; *PT*—special calling battery, 60 volt; C_1—condenser; C_2—condenser.—M. Viard, *Journal des Telegraphes et Telephones.*

THE INFLUENCE OF POROSITY ON THE CAPACITY OF STORAGE BATTERIES.

The capacity of a lead storage battery depends not only on the quantity of the active substance but also on the degree to which the acid reaches the porous spaces in the battery plates. The more rapid the sulphuric acid found between the plates can reach within these pores and replace the used up liquid, the longer it will take for the active fluid around these pores to reach that final stage when the e.m.f. is so low that the battery has to be renewed. Other things being equal, the time of discharge and, therefore, the capacity has to be increased by using a material with numerous and with wide pores. Increase of the porosity brings with it an increased capacity. This advantage, naturally, is greater in plates made up of special pastes than with plates having a large area, whose effective layer is, however, very thin. Moreover the greater advantages of the porous material will show greater, the higher the discharge current is, for the consumption of acid per time unit and the quantity of water formed on the positive plates is proportional to the current strength per unit of area. On the other hand the speed of acid consumption depends not only on the difference in acid percentage on the outside and on the inside of the pores, but also on the frictional resistance which the acid suffers when passing through the narrow

hollow spaces. This friction is independent of the current density and, therefore, the acid equilibrium has to be made more advantageous by using a porous material for the plates. In this way it is therefore possible to increase the capacity of the storage batteries, in spite of the decrease of the effective substance in the electrodes,

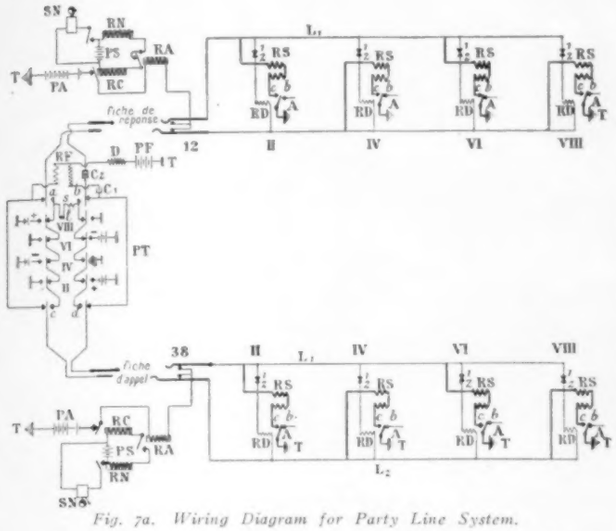


Fig. 7a. Wiring Diagram for Party Line System.

for the latter is used up only in part, since the exhaustion of a battery is not due to the failure of the active substance but through the weakening of the acid in the vicinity of that substance.

P. Schoop was the first one to recognize the possibility of increasing the capacity of storage batteries through an increased porosity of the battery mass and he proved his point by an experimental battery, whose capacity for a 3-hour discharge he increased by 18 per cent. Jumau, a French engineer, obtained a greater porosity by placing pastes made up of five different lead oxides into a lattice framework and reached an increase of 8 per cent capacity. Owing to a patent suit the author had to make investigations in this field and came to conclusions which seem to be of interest.

For all of the battery plates the same hard lead lattice framework of 5 inches height, 4 inches width and 0.2 inch thickness was used. The lattice work openings were 1x0.8 inch and were superimposed by half the height on both sides of the lattice frames. To obtain varied active porous materials, the same red lead and sulphuric acid (22° Be. 1,180 spec. gr. 15° C.) were used to make four different pastes, each one having a different proportion of red lead from the other one. The pastes were made more mobile and the dried mass more porous, for the peculiar drying process used made the mass fill the lattice work completely. The pastes were filled into the frames when wet and then dried by a patented process whose details are not given. The amount of sulphuric acid which was mixed to the same quantity of red lead in each case had the ratio in the four pastes A-D as:

A B C D,

the volume added to the thickest paste

100:121:143:171

being 100. To each paste was added in mixing, a small portion of glycerine, whose volume when compared to the acid used is extremely small. Each paste was thoroughly mixed and brought within the lattice frames before it had time to set. Paste D was very mobile, C was more tenacious, B was thick like dough, A of stiff consistency as usually used for plates. Pastes A to C were filled in without pressure, care being taken that the paste just filled the latticework and did not protrude over the surface. Then the plates were dried in a special furnace, so that the dried paste will not disintegrate when the plates are set into the acid. The tests made with these special pastes proved that the assumptions stated were correct.

Both negative and positive plates were made, the former somewhat thinner than the latter. After drying, all of the plates were formed as negative plates, and then reformed to positives. Two positive plates and three of the negative plates, which were alike in all cases, were united to form a cell. The vessels were of celluloid and contained, after fitting in the plates, about 1.3 liter acid. Pure sulphuric acid of 24° Be., spec. gr. of 1,200 and 59° F. was used. Eight discharges at 7.5 amperes were made with the test cells. The change in temperature during a discharge was about 35° to 37° F. The discharge was considered ended when the terminal voltage had dropped to 1.80 volts. Charging was carried on till the battery showed 2.70 volts. After 15 hours of the first charging the plates were completely charged. Then followed eight pairs of discharges and charges, one pair being carried on each day. The cells left from the previous evening were charged the following morning for 15 minutes with current. Then followed the discharge and then immediately charging. The pause between the end of the discharge to the charging next morning was 14 hours. The first four pairs of charging and dis-

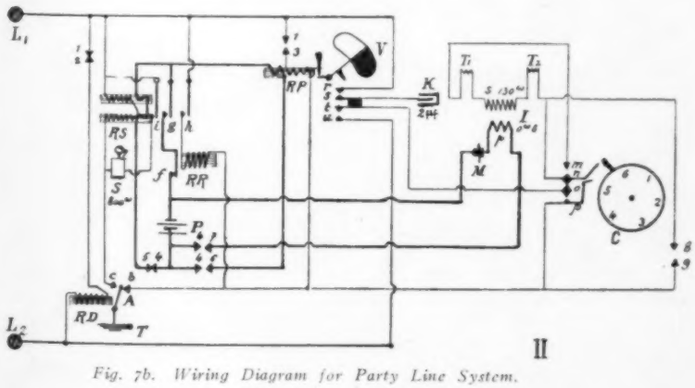


Fig. 7b. Wiring Diagram for Party Line System.

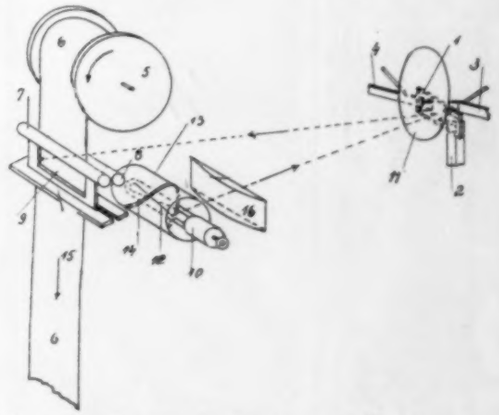


Fig. 8. Apparatus for Reproduction of Light in Visible Form.

charging were to bring the cells to a normal condition and the results are given from the fifth set on.

TABLE 1.

Capacity and Final Temperature.

	Cell A		Cell B		Cell C		Cell D	
	% Inc.	Temp.	% Inc.	Temp.	% Inc.	Temp.	% Inc.	Temp.
5	27.8	66.2	29.4	67	32.4	69.5	34.4	67
6	28.7	66.5	30.5	67	32.4	70	34.5	67
7	28.7	66	30.9	68.5	32.2	69	34.7	68
8	28.8	65.5	30.2	67.5	32.2	69.6	34.6	67.2
Average	28.5	66.3	30.2	67.5	32.3	69.5	34.6	67.4

TABLE 2.

	Plates A.	B.	C.	D.
Consistency of paste	Stiff	Thick Paste	Sluggish	Mobile
Acid volume, added to the same quantity of red lead, related to A=100	100	121	143	171
Capacity in per cent	28.5	30.2	32.3	34.6
Capacity related to that of A=100	100	106	113	121

The capacity in all cases has increased by about 20 per cent. It might even be possible to increase to a higher capacity if it were possible to produce still more porous plates without running the danger of disintegration as soon as the plates are set in the acid.—C. Heim, *Elektrotech. Zeit.*

PHOTOGRAPHIC REPRODUCTIONS OF VIBRATIONS OF A POINT OF LIGHT.

The French company "La Telegraphic Rapide" has developed an apparatus which permits photographic reproductions of the vibrations of a point of light in form of lines, the vibrations being transmitted by one or two telephones influenced by the proper current to a mirror in such a way that the movements of a point of light falling on this mirror and reflected by it are transferred to a strip of paper on which the light is reproduced in form of lines, which can be transferred by a known code into sentences.

In Fig. 8, the mirror *1* rests on the permanently fixed point *2* and is moved by two spring segments *3* and *4*, which are under the influence of a telephone diaphragm. One of the telephones gives vertical, the other horizontal movements, and the mirror rotates about a horizontal axis under the influence of segment *3*, and about a vertical axis under the influence of segment *4*. The light-sensitive paper *6* used for the reproduction of letters is wound over the drum *5* between the rollers *7* and *8* of the illumination place *9*. To light the mirror the lamp *10* or any other shaded light can be used. The luminous thread *12* of the tube shaped electric lamp *10* is surrounded by an opaque cylinder *13* made of metal, which is provided with a narrow slit *14*. That small portion of the filament shining through the slit, can be changed by means of the objective *11* into the shape of a ray or point of light, which, after reflection by the mirror *1* traces the movements of the mirror on the light sensitive paper. In order to permit tracing on the paper in form of lines, the ray of light on the paper *6* at the point of light *9* must be given a movement diagonally across the paper. For this purpose the slit *14* in the metal cylinder *13* is constructed so as to take a wormlike movement and the metal cylinder *13* itself can rotate. If this cylinder rotates, another portion of the filament *12* will always illuminate the mirror, and the ray of light which is transferred, changes its direction and writes a line, which stops as soon as the end of the worm movement slit between filament *12* and mirror *1* has been reached. As the rotation proceeds, the light of filament *12* can fall on the mirror at the other end of the worm movement *14* and a new line is started. The light which is reproduced shows in the form of a square, whose height is determined by the thickness of the luminous filament, while the width is determined by the width of the screw-shaped slit *14*.

The luminous filament *12*, however, is necessarily further distant from the objective *11*, than the slit found on the surface of the cylinder *14*, which slit comes to lie between the luminous filament and the objective. The result is, that the one limit of the light ray falls further away from the objective in the direction of the filament, than does the other one in the direction of the width of the slit and consequently the reproductions of the various rays of light do not fall in the same plane and are not equally clear. All these difficulties of the older designs are eliminated in the present design, by bringing in the vicinity of the screw-shaped slit *14* between source of light and objective a cylindrical lense *16*. This has the effect that the rays of light are deviated only in the direction of the width of the slit, but suffer no change in direction in the direction of the thickness of the filament. This cylindrical lense allows the two limits of the points of light to be brought into the same plane and thus concentrates a sharp, clear ray of light on the paper *6*. In this apparatus a convex lense is used between the slit *14* and the objective *11* which gives an enlarged picture of the real length of line transmitted, on the sensitive paper *6*. As this enlarging is only desirable in the direction of the movement of the point of light, i. e. in the direction of the lines to be reproduced, a convex-cylindrical lense is used and not a spherical lense.—*Telegraphen u. Fernsprech Technik.*

National Electrical Safety Code

For a number of months past, hundreds of utility engineers, workmen, municipalities, state commissions, casualty, fire and engineering associations have been making a careful study of the proposed National Electrical Safety Code at the suggestion of the Bureau of Standards. A score of large conferences, occupying one or more days, and many smaller conferences have been held by members of the Bureau of Standards in all parts of the country, and the opinions and experiences thus received from all interests the country over compared.

There will be a formal convention to consider these rules in Washington, D. C., October 27. All wire companies, with particular reference to telephone companies, should interest themselves in these rules and this conference. As we understand it, the telephone companies will be required to follow these rules in matters of wiring, electrical protection, railroad crossings, high tension crossings, etc. The Independent Telephone Association of America will be represented at this final convention.

Western Pennsylvania Association to Meet

K. B. Schotte and his associates of the Kittanning Telephone Company are to be hosts to the members of the Western Pennsylvania Independent Telephone Association and their friends on October 14 and 15. A splendid program has been prepared. An operators' school, in charge of W. S. Vivian, secretary of the Independent Telephone Association of America, Chicago, has been arranged for. A large attendance is anticipated.

Standardization Committee

On September 16 and 17 a full meeting of the Standardization Committee was held at Chicago. Final draft of the proposed Tentative Standards of Telephonic Transmission was adopted. This will be published in pamphlet form and distributed to member companies.

ASSOCIATION NEWS

by THE INDEPENDENT TELEPHONE ASSOCIATION OF AMERICA for
1504 Association Building, CHICAGO, ILL.

BY W. S. VIVIAN

ARRANGEMENTS for the convention which will be held at San Francisco, October 26, 27, 28 and 29, are now nearing completion. An excellent program has been arranged. E. P. Morphy, secretary of the Home Telephone & Telegraph Company, Los Angeles, will give an address on "Measured Service." Charles E. Sumner, president of the San Diego Home Telephone Company, San Diego, will give an address on "Proper Relations Between Municipalities and Public Utilities." E. B. Fisher, president of the Independent Telephone Association of America, will give an address on "Past, Present and Future." A. Wardman, of Whittier, Cal., secretary of the California Independent Telephone Association, is to talk on "Co-Operation." Charles A. Rolfe, vice-president of the Southwestern Home Telephone Company, of Redlands, Cal., is to talk on "Efficiency or Inefficiency, Which?" Albert Schuler, manager of the Home Telephone & Telegraph Company of Santa Barbara, Cal., will talk on "The California Cable Bug." T. A. Gould, manager Redondo Home Telephone Company, Redondo Beach, will talk on, "Commission Regulation From Class C Standpoint." It is also expected that a representative of the State Railroad Commission of California will give an address on, "Commission Regulation of Telephone Companies." There will be several other numbers on the program, arrangements for which have not as yet been completed.

Hotel Plaza, San Francisco.

Recent reports indicate that there will be a good attendance from the western states, especially California, Oregon and Washington. The association has recently sent out 2,500 itineraries of the proposed trip, which have brought forth a number of inquiries from telephone people in the middle and eastern states. The association plans to have a special train of at least 125 people aboard when it leaves Chicago at 10:30 on the evening of October 21.

The train will go over the Rock Island lines via Rock Island, Davenport, Des Moines, Omaha, Lincoln and Colorado Springs, arriving at Colorado Springs at 7:15 a. m., Saturday, October 23. A stop-over of five and a half hours will be made at Colorado Springs, one of the most beautiful home cities of the west, with broad streets and magnificent residences, with Pike's Peak and Cheyenne Mountain on the west. Here are located many points of wonderful interest, and it is conceded to be a favorite stopping point for tourists. Some of the most noted side trips which can be made from this point are a trip up "Pike's Peak," "South Cheyenne Canyon and Seven Falls," "Garden of the Gods," "Crystal Park Auto Trip," "The Cliff Dwellings," "Cave of the Winds" in Williams Canyon, "The High Drive," "Mount Manitou Incline," and many others.

The special train will leave Colorado Springs at 12:45 o'clock noon, October 23rd, passing through the famous Royal Gorge in the afternoon then on over Tennessee Pass over the Continental Divide, the crest of which is pierced by a tunnel half a mile long, the south end opening upon the western slope. Special train will arrive at Salt Lake City, Utah, at 1:30 p. m., October 24, where a stop-over of about three hours will be made. This portion of the day will be spent in a free-auto-sightseeing trip. Salt Lake City affords many points of interest, among which are the Mormon Temple Gardens with the great Tabernacle and Assembly Hall, located on Temple Square. Here an opportunity will be given to hear the famous pipe organ. The stop in this city, while of short duration, will prove to be one of more than pass-

Through the Royal Gorge.

At the San Francisco Exposition.

ing interest, and will be highly enjoyed by every one of the party. The special train will leave this city at 4:30 p. m., mountain time, or 3:30 p. m., Pacific time, proceeding westward on the journey over the Western Pacific Railway. The special train will follow the Feather River Canyon, the scenic beauty of which is unsurpassed in any place in the world, and will traverse 117 miles, passing through forty-seven tunnels, arriving at the journey's end, San Francisco, at 8:30 p. m., October 25.

It will be possible for those desiring to attend the convention to join this train anywhere en route. The Gregory Tours will do everything possible to make the journey pleasant and convenient. Upon arrival at San Francisco, they will see to the transferring of the baggage, and assignment of rooms at Hotel Plaza in such a way that there will be no delay or confusion to members of the party.

The seven days spent at San Francisco bid fair to be seven busy days. The convention itself with four half-day sessions, the telephone exhibits that will be in the Exposition Hall, the visits to the Panama-Pacific International Exposition, the numerous side trips that have been arranged, such as the trip to Mt. Tamalpais, the steamer trip on San Francisco Bay, the trolley trip through Oakland, Alameda and Berkeley, the night trip through Chinatown, will keep all very busy.

Of course, all will wish to take advantage of the opportunity to visit Los Angeles as well as the California-Panama Pacific Exposition at San Diego. Numerous invitations have been received for our party to visit these different places. At San Jose the Business Men's Organization has invited our entire party to take a complimentary trip with it through the great Santa Clara Valley. The Home Telephone Companies at Los Angeles and San Diego have cordially invited all to visit their properties and give them an opportunity to show them about.

All who have given this matter thought agree that this is an exceptionally fine opportunity for telephone people and their friends to visit the West and to see the country. The expositions enable one to see quickly the great improvements that have been made throughout the world in recent years. It is a splendid opportunity to combine business and pleasure.

News Reports of Interest to Members

ALABAMA

Telephone Connection Will Be Re-Established

Rogersville, Ala., Aug. 25.—A local company has been organized to re-establish the one-time telephone system at this place. Direct connection is to be made with Athens, Florence, and other places nearby—Montgomery (Ala.) Advertiser, Aug. 26, 1915.

ARKANSAS

Telephone Girls Get Raise

Approximately 200 telephone operators in Arkansas will receive an average increase in wages of 25 per cent., beginning to-day, under the agreement between the Southwestern Telegraph and Telephone Company and the Minimum Wage Commission, made two weeks ago. Under the agreement apprentices will receive not less than $20 per month, which is to be gradually raised to the minimum wages of $1.25 per day.—Little Rock (Ark). Gazette, Sept. 15, 1915.

CALIFORNIA

It Was Easy Money

It is estimated that the recent order of the state railroad commission directing the Pacific Telephone and Telegraph and allied company to return (within 90 days) to their patrons the $5 deposits extracted from the people, will transfer about $1,000,0000 from the company treasury back to the people.—Stockton (Cal.) Republican, Aug. —, 1915.

Chicago Alderman to Inspect Telephones Here

Thomas O. Wallace, alderman of Chicago, arrived in Los Angles yesterday to investigate the workings of the automatic telephone system of the Home Telephone Company. He called on Acting Mayor Betkouski, who went over the local telephone situation with him.

Alderman Wallace informed the acting mayor that the city of Chicago is going to forfeit the franchise of the Chicago Automatic Telephone Company, and it is for the purpose of studying up the working of the automatic system in other cities that he came west.—Los Angeles (Cal.) Tribune, Aug. 22, 1915.

New Telephone Tariff Sought From State

The Pacific Telephone and Telegraph Company yesterday filed applicaton with the railroad commission for an investigation of its affairs, and a readjustment of its rates to give it an adequate return on the investment.

The application sets forth that the company operates in California, Oregon, Washington, Nevada and Idaho, and that its California business is an integral part of the whole system and reaches every district of California.

The company stated that it has not a complete inventory of its property, but is now engaged in compiling one. It wants this inventory investigated, and then rates fixed which shall be "just, reasonable and adequate to the company, its subscribers, and the public."—Los Angeles (Cal.) Examiner, Sept. 9, 1915.

Railroad Phone Law May Be Modified by State

Hearing will be resumed before the railroad commission Monday in the action brought by the Southern Pacific regarding the act passed by the last Legislature requiring railroads to dispense with the telephone in transmitting train orders and use the telegraph exclusively. It is thought probable the act will be modified to allow the use of the telephone for emergency messages.—San Francisco (Cal.) Call, Sept. 11, 1915.

TENNESSEE

Extension of Jurisdiction

Montgomery, Ala., Sept. 9.—Authority to regulate rates of all telegraph and telephone companies doing business between cities and in cities of Alabama was conferred upon the railroad commission by a bill of Representative Cooper, of Marengo, which was passed with only six dissenting votes. The bill provides that the commission may have suervision over all rates on intrastate and intracity business, and may change them by lowering or increasing, if it thinks they are not equitable.—Nashville (Tenn.) Banner, Sept. 9, 1915.

WASHINGTON, D. C.

Telephone Contract Refused

Automatic telephones installed by the post-office department to connect all offices in the department building and provide connections with the city government and the government printing office are pronounced by department officials to be giving satisfaction. The telephone company operating in the district, however, will not sign a contract with the department that will permit connection to be made between the outside system and the automatic system, and in consequence there is no contract now in force between the parties. The treasury has held up the signing of a new agreement and the telephone service is being furnished under the terms of the old contract.

If the local company still refuses to come to terms, pending the result of the test, there will be no overtures from the government, it is said. Washington (D. C.) Post, Sept. 22, 1915.

GEORGIA

Postal to Have Telephone System

The Postal Telegraph Company is installing a long-distance telephone service between Savannah and points in Georgia, South Carolina and North Carolina, according to an announcement made yesterday by Manager W. A. Boyle of the Savannah office.

The company, Mr. Boyle said, has already made its connections and now has several telephones installed in business houses in Savannah. A booth will be installed in the Savannah Cotton Exchange.

At first the only connections out of Savannah will be Aiken, Atlanta, Camden, S. C., Augusta, Columbia, Fayetteville, N. C., Macon and Raleigh. Later, however, the system will be extended until long-distance service may be obtained over the wires of the Postal to most any point in the United States.

The rates, according to Mr. Boyle, are nearly fifty per cent. lower than those of any other long-distance telephone system in this section.—Savannah (Ga.) News, Sept. 3, 1915.

ILLINOIS

Clayton Companies Plan Consolidation

Clayton, Ill., Aug. 27.—Subject to the approval and consent of the public utilities commission, the Clayton Exchange and Siloam Springs Telephone companies, competing companies in this place, will merge. The Clayton Exchange, the larger of the two will purchase the holdings of the Siloam company.

The companies will become one as soon as the proper action is taken by the public utilities commission.—Quincy (Ill.) Journal, Aug. 27, 1915.

Bell Concern on Tax Carpet

In considering a personal property assessment involving $19,000,000, a discrepancy of $139,450 might not seem material. It was enough, however, to induce the board of review to send for officials of the Chicago Telephone Company and request an explanation of why its personal property assessment is less this year than last. The hearing was set for this afternoon.

Frank S. Ryan, one of the reviewers, did a little research work on his own account. He says the telephone company officials will be asked why there is a smaller assessment this year, and also why the company paid less taxes last year than the year before.

"It will take a lot of explaining to show me why the telephone company paid actual taxes of $190,831.67 in 1913 and only $126,019.40 last year," said Mr. Ryan. The records show that the tax extended last year amounts to $140,780.89, and the company paid $126,019.40 on account. This year the total personal property assessment against the Chicago Telephone Company is $19,682,730, while last year it was $19,822,180. Do you mean to tell me the company is doing less business every year?"—Chicago (Ill.) News, Sept. 2, 1915.

Telephone Merger.

Upon the decision of the attorney general now hinges the merger of the Interstate Independent Telephone Company with the Bell interests. Should the attorney general approve the purchase of the independent company by the Bell Company, the plan will be presented to the Illinois Public Utilities Commission, and if that body consents to the merger the securities of the independent concern now on deposit with the Northern Trust Company will be paid for by the Bell Company.—Chicago (Ill.) Journal, Sept. 3, 1915.

Will Rebuild Telephone Plant

Clinton, Ill.—C. B. Cheadle and E. B. Sterrett, president and secretary of the National Telephone and Electric Company of this city

were in Clinton yesterday, and discussed freely the future plans of the company with regard to the reorganization of the company and the improvements contemplated. This much the gentleman said, and that was that the plant would have to be completely rebuilt, and much of this work will take nearly all winter. The company has already received a carload of wire and other material to be used in repairing the lines, which are sadly in need of it.—Bloomington (Ill.) Pantagraph, Sept. 10, 1915.

Science and Business

The relative importance of the telephone to the business of the country is illustrated by the statement that as many telephones have been installed in the United States in the last four years as were installed in all the years previous to that time. An eminent financier has said that the sudden abolishment of the telephone would create a panic in this country beside which all former panics would shrink into insignificance.—Peoria (Ill.) Star, Sept. 17, 1915.

More Letters at Telephone Trial

More correspondence regarding the "one-hundred mile contract" between the American Telephone and Telegraph Company and the Central Union Telephone Company was read in the Superior Court this morning. The Central Union Company is a defendant in a suit by its minority stockholders, seeking an accounting of funds amounting to $32,000,000.—Chicago (Ill.) Journal, Sept. 21, 1915.

INDIANA

Files Suit to Block Rate Increase

Logansport, Ind., Sept. 10.—Suit challenging the validity of the statute under which the Indiana Public Service Commission operates was filed in the Circuit Court here today by M. Winfield, a lawyer, who is himself the plaintiff. The complaint charges that the Public Service Commission has exceeded its powers in increasing the rates of the Logansport Home Telephone Company above the rates fixed when the company took a franchise from the city.

The complaint further alleges that the telephone company cannot legally surrender or terminate its franchise, and that the commission cannot legally take over the powers of the city in the matter of fixing the rates for public utilities.

It is averred that the law creating the Public Service Commission is unconstitutional because it tends to impair the obligation of a contract.

The commission recently granted to the Logansport Home Telephone Company an increase in rates based upon the appraised value of the property. The telephone company, an organization of local business men, offered to sell its plant and business to the city at the value fixed upon it by the appraisers of the state commission.

In the suit Winfield does not disclose for whom he is acting, the inference being that he has brought the suit of his own volition.—Indianapolis (Ind.) Star, Sept. 11, 1915.

An Interesting Point

Logansport has an interesting telephone controversy in which one important point of the public utilities law is questioned. The home telephone company of that city surrendered its contract with the city and petitioned the public service commission to fix a new scedule of rates. The commission inquired into the property of the telephone company and fixed rates that were above those of the franchise. The action of the commission is now questioned.

According to a complaint filed by M. Winfield, as a citizen, the telephone company, under the old franchise, was serving 3,000 patrons at the rate of $15 a year for one-party lines and $12 for two-party lines, the maximum rate provided for under the ordinance; that more than 500 business houses were being supplied telephone service at $30 a year, the maximum price. Under the new ruling the rate for one-party lines in a residence district is $24 a year, $21 for a two-party line and $15 for a four-party line; business phones, one-party lines, $36, and two-party lines, $30. The maximum under the ordinance for business phones was $30.

Mr. Winfield in his complaint avers that the proceedings before the public service commission and the attempt on the part of the telephone company to surrender its right and disregard its contract obligations is in violation of the constitution of the United States, prohibiting any state from passing any law impairing the obligatons of any contract, and is also in violation of the constitution of the state of Indiana, which denies to the legislature the power or authority to pass an act which impairs the obligation of any contract.

The right of the commission to fix rates under such circumstances is one of the main features of the utilities law. Future proceedings will be watched with interest.—Lafayette (Ind.) Journal, Sept. 14, 1915.

IOWA

Pole and Wire Tax Appeal Perfected

The Iowa Telephone Company yesterday perfected an appeal in the Supreme Court in the action brought by Des Moines to recover $100,000 pole and wire tax as payment for use of the city streets.

The company lost in the Polk county court. Judgment for $71,658.49 was rendered in favor of the city. From this the telephone company appealed to the high court. It claims the right to use the streets without payment of tax. The attorneys for the company assert that the courts ruled in 1903 that the Iowa Telephone Company has a right forever to occupy the streets, avenues, alleys and other public places of Des Moines.

If the Supreme Court affirms the decision of the Polk county district court in this case, the city of Des Moines will be entitled to collect from the telephone company the amount of the original judgment and $27,683 for every year after 1913 which the case has run.—Des Moines (Ia.) Leader, Aug. 20, 1915.

Value of Small Courtesies

Iowa City Republican: A mathematician has figured out that a certain telephone company is losing 125 hours work a day every day through the time taken by its operators to say "Please."

Yet the efficiency of an employe is not always measured by the capacity to hustle through the most work. There are some men in such positions as life jobs. They are irritated by foolish questions, and they take it out on the general public. No doubt they are hurried and nervous. If so, they should go into some other occupation requiring less nerve strain. They answer questions in monosyllables as much as possible, and rarely help the perplexed questioner by an intelligent account of the situation.

A man in a position, where he stands between the public service corporation and the public, can do a great deal of harm. The public may not suffer any great loss in dealing with him. But his attitude makes his corporation seem something unfriendly and hostile. It will prejudice more people than more serious abuses in the way of too high rates.

Many corporations, particularly during recent years, have been emphasizing the value of little courtesies. Every question is answered with the maximum of courtesy, and pains are taken to make people comfortable. The public overlooks a great many wrongs when it is attended to in this friendly fashion.

The question with which this article started, as to whether telephone operators should take time for manners and courtesies, has often been raised. Telephone operation is nervous work. Every time an operator can stop for a single word of good manners she makes the great telephone machine more human and friendly.—Burlington (Ia.) Hawkeye, Aug. 27, 1915.

KANSAS

Tax Commission Will Look Into Phone Reports

Corporation officials should have good memories and exercise a little care in making statements about the value of their property. The difference between taxation assessment values and those reported when it is desired to increase prices for service should not be too great, for it may result in a little investigation and a come back for a raise on the former. Something of this nature is said to be going on right now with the People's Home Telephone Company.

Low Tax Value.

The telephone company officials made a personal property return of $152,000 to the county assessors, alleging that this was all their property was worth. Later on this was raised to $216,000 by the state tax commission, but the county officials wanted it placed considerable higher.

The assessment of the telephone company was $215,998 for the year 1914, and when they made a report this year to cut this down to $152,000, and to place $20,000 of it in Kickapoo township, away from the high city tax levy, the assessors objected and a controversy set in that lasted over a period of several months. The state board made an increase of $64,000, but allowed the placing of $20,000 of this in Kickapoo township to stand.

High to Fix Rates

Quite recently the telephone company decided to ask permission to increase the telephone rates in Leavenworth, and they prepared and submitted an elaborate statement showing that their property was worth $574,767.51, more than $400,000 above what they turned in the value for taxation purposes—Leavenworth (Kans.) Times, Aug. 31, 1915.

May Fight Extra Telephone Charge

Constant complaints are being made to city officials against the attempt of the Iowa Telephone Company to charge an additional 25 cents to subscribers who fail to pay their bills before the fifteenth of each month.

The city legal department has advised those persons complaining to it that the extra 25 cents charged as a penalty is "not properly collectible."

Until a few months ago the telephone company mailed to its party line subscribers, for instance, bills for $2, with a notification that a penalty of 25 cents would be taxed unless they were paid before the fifteenth of the month.—Des Moines (Ia.) Leader, Aug. 31, 1915.

KENTUCKY.

The Science Hill Farmers Telephone and Exchange Company, Science Hill; capital, $2,000. Incorporators, John E. Dickerson, W. H. Lyon, E. W. Ratliff, L. D. Stringe and Alex Stroud.—Louisville (Ky.) Herald, Aug. 12, 1915.

LOUISIANA

Lake Charles, La., Aug. 25.—Residents of the Choupique have organized a farmers' telephone company with a capital stock of $3,000, and enough stock has been subscribed to make it a going concern. About twenty telephones will be placed in operation at the start. Officers of the company are the following: R. B. Trahan, president; G. K. Lacy, vice-president; J. J. Cosner, secretary and treasurer. L. Hoelzer, John Moss, J. L. Lacy, R. J. Landry and M. J. Broussard, directors.—New Orleans (La.) Picayune, Aug. 26, 1915.

MASSACHUSETTS

Government acquisition and operation of telephone and telegraph companies and political equality for women are strongly urged as remedies for existing industrial unrest in report of Research Director Basil P. Manly to the United States commission on industrial relations.—Boston (Mass.) Christian Science Monitor, Aug. 25, 1915.

MICHIGAN

City Wins Telephone Appraisal Tilt

Winning every point for which he contended, Edward P. Burch, the city's expert adviser in its fight against the petition of the Michigan State Telephone Company for increased rates and partially metered service, was authorized by the Michigan state railroad commission to proceed with a complete appraisal of the company's properties and an analysis of its earnings, expenses and financial arrangements, at a conference in the city hall Wednesday.

Chairman Glasgow, of the railroad commission, upheld Mr. Burch in his contention that his analysis of the company's condition should cover three years, instead of one, as the company desired.—Detroit (Mich.) Journal, Aug. 19, 1915.

Tarte Heads Telephone Association

At the annual meeting of the Michigan Independent Telephone and Traffic Association Tuesday, officers were elected as follows: President, C. E. Tarte, Grand Rapids; vice-president, W. J. Melchers, Owosso; secretary-treasurer, F. V. Newman, Grand Rapids; new directors, George L. Hall, Dowagiac, and J. H. McMillan, Bay City.

The association is the clearing house for the settlement of exchange business among the independent companies.—Grand Rapids (Mich.) Press, Aug. 25, 1915.

Ford Car Aids Telephones

A telegram to the Ford Motor Company from Galveston, Saturday, conveyed an interesting story of the part played by a Ford in putting the telephone system back into operation after the terrific hurricane had struck the southern city and put all power plants and means of communication out of business.

The telephone system was out of business until a Ford car was brought into use. The engine was started and attached to a generator. The electrical power thus supplied was sufficient to rejuvenate the entire telephone system and the plant was soon in operation. The work of rescue and relief was thus greatly aided.—Detroit (Mich.) Journal, Aug. 21, 1915.

Telephone Officers Elected

Osseo, Aug. 26.—Saturday, Aug. 28, the newly elected board of directors for the Hillsdale county phone company met at the Osseo hotel to elect officers. The result was as follows: President, Marion G. Mosher; secretary, Louis S. Hackett; treasurer, Joseph Wayman. Mr. Mosher and Mr. Hackett are re-elected and Mr. Wayman is a new official.—Hillsdale (Mich.) News, Aug. 26, 1915.

Telephone Folk in Annual Picnic

More than 400 employes of the Valley Home Telephone Company, from Bay City and Saginaw took part in the annual outing of that company held yesterday at Linwood beach. A special train of three coaches on the Detroit &

Mackinac railroad conveyed the party to and from the beach, while the Saginaw contingent, numbering about 200, had special interurbans to and from Bay City. The employes say it was the best outing ever held by them.—Bay City (Mich.) Tribune, Aug. 30, 1915.

Citizens Earnings Show an Increase

The published statement of the earnings of the Citizens Telephone Company, just issued, for the year ending June 30, does not show comparisons with last year. The comparisons show encouraging growth in the company's business, although the gains are not large. The gross operating earnings for the year just closed were $867,833.78, a gain of $29,271.07, or about 3½ per cent. Interest and other income for the year was $32,338.18, a gain of $1,239.14. The operating, maintenance and general expenses were $401,540.18, an increase of $13,987.35, and the taxes were $56,047.26, a decrease of $341.92. The net earnings for the year above taxes were $410,246.34, an increase of $15,625, or nearly 4 per cent. This year the company paid out interest charges of $27,368.86, an increase of $1,376.35. The depreciation allowance this year was $157,422.33, an increase of $3,044.82, in both years the allowance representing about 4 per cent of the gross earnings. The expenditures from the depreciation reserve this year were $78,338.01, an increase of $39,844.78, or more than double the expenditure last year. The company this year carries $22,883.40 to surplus and sinking fund, while last year the surplus was less than half that amount, or $10,927.15. The comparative report indicates that the company earned something over 10 per cent on the capital stock with the reconstruction and depreciation reserve to come out.—Grand Rapids (Mich.) Press, Sept. 19, 1915.

School for Phone Girls

Traverse City, Sept. 10.—A school of instruction is being held here to-day by the Citizens Telephone Company, under the supervision of C. E. Smith, of Grand Rapids, traffic manager for the long-distance operators for the Cadillac, Manton and Traverse City districts.—Grand Rapids (Mich.) News, Sept. 10, 1911.

Reduce the Directorate

The Citizens Telephone Company stockholders, at their annual meeting, authorized amendment of the articles of association making the directorate consist of twelve members and not filling the vacancy caused by the death of Judge W. J. Stuart, thus reducing the directorate by one member. Directors were re-elected and reports made for the year. Directors are John B. Martin, R. D. Graham, Van A. Wallin, Charles F. Young, William J. Clark, Percival B. Garvey, Victor M. Tuthill, Gaius W. Perkins, Charles E. Tarte, Cyrus E. Perkins, all of Grand Rapids; Frank E. Church, of Lansing, and Willard K. Spencer, of Ionia, who were added to the board last year.

The out-of-town directors complimented the company on its management and the showing made for the year.

Directors will meet to-morrow night, when present officers probably will be re-elected and the vacant treasureship filled.—Grand Rapids (Mich.) News, Sept. 15, 1915.

Would Increase Rate of Dividend

A meeting of stockholders of the Valley Telephone Company has been called for September 22, at which time a vote will be taken on the proposition of increasing the dividend on preferred stock to 7 per cent. per annum. At present this stock pays 6 per cent.

In a letter sent out to stockholders, President Trask states that few preferred stocks paying but six per cent dividends can be sold on the market at par now, owing to the fact that there are plenty of better paying stocks to be had.

He says that with the increased dividends the company will be able to sell stock more easily and provide necessary finances for its betterment, and that the earnings have far exceeded the dividends on the preferred stock for several years past. A vote of two-thirds of all of the stockholders is required to increase the dividend rate.—Bay City (Mich.) Times, Sept. 16, 1915.

Telephone Company Wins

Ann Arbor, Mich., Sept. 13.—The case of the village of Dexter against the Michigan State Telephone Company to determine whether the company had a right to trim shade trees in the village, despite an order to the contrary, was dismissed by Justice Marcus Cook, of Dexter.

The case had attracted wide attention because of its bearing on the right of a public utility corporation to clear the right of way for its line.

Justice Cook ruled that the company, being engaged in the transmission of long distance messages, might continue to do business, and if necessary trees might be trimmed to enable the business to go on. He intimated that if dissatisfaction existed the matter should be settled by an action for damage, but not by criminal action against employes.—Hillsdale (Mich.) News, Aug. 18, 1915.

Young Re-elected President

The directors of the Citizens Telephone Company organized Thursday night by re-electing president Charles F. Young; vice-president, Robert D. Graham; secretary, A. E. Wells, and general manager, Charles E. Tarte. John D. Martin was elected treasurer to succeed Judge William J. Stuart, deceased. Mr. Young accepted re-election to the presidency on the condition that he be permitted a wide latitude in the amount of time he should give the company. During the last year under his administration the company has made marked progress.—Grand Rapids (Mich.) Press, Sept. 17, 1915.

MINNESOTA

Tri-State Telephone and Telegraph Company

The directors of the Tri-State Telephone and Telegraph Company have declared the forty-ninth quarterly dividend of one and one-half per cent (six per cent per annum) on the outstanding preferred stock of the corporation.

This dividend will be payable Sept. 1st, 1915, to stockholders of record at the close of business on Aug. 19th. The stock transfer books will be closed from Aug. 20th to Aug. 31st, inclusive.—Advertisement.—Minneapolis (Minn.) Tribune, Aug. 25, 1915.

Automatic Phones in Downtown Exchange

Automatic telephone service for St. Paul was brought a step nearer today when the work of equipping the downtown exchange of the Tri-State Telephone Company, at Eighth and Cedar streets was started.

Twenty tons of automatic equipment arrived in St. Paul to-day for the downtown exchange. According to G. W. Robinson, president Tri-State Company, it will take two or three weeks to install it all. As soon as that has been done automatic equipment will be put in the exchange at Dale street and Hague avenue.

"It will probably be 10 months before the company will be able to use the automatic telephones," said Mr. Robinson. "After the equipment has been placed in each exchange, each telephone instrument in St. Paul will have to be exchanged for an automatic telephone. That will take a long time, of course."—St. Paul (Minn.) News, Aug. 25, 1915.

Crosby Wants Second Telephone Exchange

Crosby, Minn., Aug. 24.—The Crosby Commercial Club has appointed committees to invite the Tri-State Telephone Company to extend its lines to Crosby. This company is ready to build into Brainerd.—Duluth (Minn.) News-Tribune, Aug. 25, 1915.

Would Boost Telephone Rate

The Northwestern Telephone Exchange Company was ordered today by the Railroad and Warehouse Commission to show cause why it should not raise its local rates in Austin.

Complaint was made against the Northwestern rates by James Keenan, who told the commission he operated the Interstate Telephone and Telegraph Company, which he says has a local exchange in Austin.

Mr. Keenan claims the Northwestern has put in rates that will not allow it to operate at a profit, and that he cannot meet the rates with profit to himself.

The Northwestern company was ordered by the commission to answer its order in twenty days from to-day.—St. Paul (Minn.) Dispatch, Sept. 13, 1915.

MISSOURI

Telephone Bonds Termed Worthless

Two suits were filed in the Circuit Court yesterday for amounts aggregating more than $50,000 against Breckinridge Jones, president of the Mississippi Valley Trust Company, and other alleged organizers of the United States Independent Telephone Company, by persons who declare they have invested in bonds of the concern.

The plaintiffs are Mrs. Mary A. Richards, of Brooklyn, N. Y., and David Master, Jr., of New York. The defendants, besides Jones, are Julius S. Walsh, William G. Lackley, William J. Lemp, Jr., Henry Nicolaus, Joseph J. Heim and the Mississippi Valley Trust Company and Mrs. Emilie Stock, executors of the estate of Philip Stock.

It is stated that the United States Independent Telephone Company was organized under the laws of New Jersey, August 25, 1905, and was capitalized for $100,000, which was increased to $50,000,000 a month later. It was given out, it is stated, that the company proposed to conduct an independent telephone system in New York City. It owned only a franchise to conduct a burglar alarm system for a limited district in New York, it is asserted. It is alleged that the bonds which are held by the plaintiffs are worthless.

Mrs. Richards sues for $3,000 of bonds said to have been bought by her, and $28,000 bought by her late husband, Edward J. Richards, who willed his estate to her. Master sues on an alleged investment of $28,000. Credits for $125 on each $1,000 are allowed in both suits.

A. J. Goodbar, of the law firm of Goodbar & Tittman, who filed the suits, said the credits were because of settlements made with the plaintiffs in similar suits against the estate of Adolphus Busch, late brewer. He said Mrs. Richards, Master and three other residents of New York sued the Busch estate about a year ago, and that settlements were made in all the suits for $125 each for the bonds, which were for $1,000 each. Suits by the other three parties will be filed in a day or two, making the total claims more than $100,000, the attorney said.—St. Louis (Mo.) Republic, Aug. 30, 1915.

MONTANA

Big Timber, Aug. 25.—Long distance connections over the Bell telephone have been made in the Home telephone office in Big Timber. The Home company has purchased the Bell line plant in the city; poles are being removed into the alley from McLeod street and everything put in shape for good service by the Home company. Mr. R. Y. Williams, the manager, who has been a resident of the city and in active work for more than three years, is making every effort to arrange for quick and reliable service when the new combination is straightened out.—Helena (Mont.) Record, Aug. 25, 1915.

NEBRASKA

The Lincoln Telephone Company has appealed from the decision of the state railway commission, according to Attorney General Reed, a non-existent body, in the Sterling telephone case. The Lincoln company will carry the case to the Supreme Court. The railway commission held that it had no authority to forbid the establishment of the "People's Telephone Company" in the territory already served by the Lincoln company.—Lincoln (Neb.) News, Aug. 25, 1915.

Commissioners Are Active

Utterly disregarding the opinion of the attorney general that there is no railway commission at this time, Railway Commissioner H. T. Clarke, H. G. Taylor and Tom L. Hall met yesterday and proceeded to transact business. The attorney general holds that there are no state railway commissioners in Nebraska, and that it is the duty of Governor Morehead to immediately appoint some of the same.—Lincoln (Neb.) Journal, Aug. 25, 1915.

MASSACHUSETTS

Federal Telephone Files Mortgage

Rochester, N. Y.—The Federal Telephone and Telegraph Company has filed a mortgage of $25,000,000. It operates an independent telephone system in Rochester, Buffalo and western New York.—Boston (Mass.) Christian Science Monitor, Aug. 23, 1915.

NEW YORK.

A Telephone Registration Bureau.

The admirable telephone service we now enjoy in this and other cities would, in my opinion, be greatly improved by adding a "registration bureau" on the same lines as the familiar "information," except that a charge would be made for its use by travelers and others wishing to record their temporary address and whereabouts.

This convenience, at a nominal charge, would be of great use and most helpful in locating transients with whom it is desired to get into immediate communication. Merchants could rapidly find their salesmen, friends failing to meet at the railroad station or steamship pier would be brought together, and many other useful services performed for the business world by its aid.—New York (N. Y.) Times, Aug. 20, 1915.

HENRY GARDNER.

Receiver for Telephone Company

Trenton, Aug. 25.—Vice Chancellor Backes has appointed Robert Carson, of New Brunswick, as receiver for the Hudson and Middlesex County Telegraph and Telephone Company. The appointment of Mr. Carson was the outcome of a petition filed by Benjamin L. Lawrence, of Elizabeth, who alleged that the company which operates in Monmouth, Middlesex and Union counties was insolvent. The receiver's bond was fixed at $50,000.—New York (N. Y.) Commercial, Aug. 26, 1915.

Bridge Phones Pay City Quite a Sum

That the recently installed telephones at the Manhattan end of the Brooklyn bridge are a good investment is the assertion made to-day by Bridge Commissioner F. J. H. Kracke, fol-

lowing a period test of nineteen days in which the city's commission amounted to $42.

Twelve coin slot telephone machines have been placed at the terminal, and for nineteen days these were productive of a total accumulation of $217.60. So successful has proven the experiment that Commissioner Kracke is contemplating the placing of similar booths in all the bridge terminals, and he believes that the commissions which will accrue to the bridge department will be large enough to pay for the entire telephone system of the bridge department.—New York (N. Y.) Globe, Aug. 27, 1915.

Makes Telephone System Connect

When it comes to providing the people with telephone service, the Canadian Railway Commission doesn't waste any sentiment on the telephone corporations. It seems to take the general position that unconnected competing systems are an unwarranted nuisance and expense, and orders that the connections shall be made when one of the systems desires it. In a judgment it has just rendered it sets the annual charge that shall be paid to the Bell company by a municipality, corporation or independent company or system that is non-competing, when it obtains connection with the Bell system; and it states that, if the Bell company and a competing independent company cannot arrive at the compensation to be paid when they connect under the compulsory order, the commission will decide what compensation is "just and expedient."

The majority of the members of the Dominion commission evidently have arrived at the conclusion that the telephone companies, as public utilities, are organized to give the people the best service possible, and that they shall do it, willy-nilly.—Rochester (N. Y.) Democrat-Chronicle, Sept. 17, 1915.

All Barriers to Consolidation of Phones Removed

Definite action toward the consolidation of the local lines of the York State Telephone Company with the New York Telephone (Bell) lines, meaning the inauguration of a single telephone service in Binghamton under the New York Telephone Company, only awaits the order of F. H. Bethel, president of the New York Telephone Company, to go ahead with the necessary legal proceedings to make the consolidation possible.

This announcement is according to a statement made to-day by H. C. Mandeville, of the firm of Herndeen & Mandeville, of Elmira, attorneys for the receivers of the American Union Telephone Company, the holding company of the local York State Company.

Attorney Mandeville announced that all preliminaries necessary to effect the consolidation of the York State lines with the Bell lines had been completed, and that the actual consolidation now depends upon instruction from President Bethel to proceed with a foreclosure sale under a blanket mortgage, given by the York State Company and the American Union Company as security for certain bonds issued by them.

Is Legal Formality

Such sale, which in reality is only a legal formality under the general corporations law, is necessary in order that the New York Telephone Company, or Bell system, can come into possession and full control of the physical property of the York State Company, which includes its lines, appliances and property in Broome, Chemung and Tioga counties. The Bell Company came into practical control of the company some years ago when it obtained a majority of the stock of the American Union Company, the holding corporation of the York State system.

The blanket mortgage given to secure York State Company bonds was foreclosed a short time before the holding company went into the hands of receivers because of default in the payment of interest on the bonds which the mortgage was given to secure. Two years ago, when plans were made for the consolidation which is about to become effective, notice of the sale of the York State property in the foreclosure action was published and it was planned to hold the sale Jan. 3, 1914. The sale was deferred, however, when a complaint was filed with the United States Department of Justice protesting against the plans for consolidation of the American Union Telephone Company with the New York Telephone Company.

State Board Favorable

Since that time the United States authorities have made it known that they would not oppose consolidations in states where Public Service Commissions would favor the plan and where the respective communities in the states would show a sentiment in favor of the two 'phone companies being combined. It was to obtain such sentiment that the matter was brought before the Chambers of Commerce in Binghamton and Elmira. Both bodies favored the plan and the matter was taken to the State Public Service Commission which has indicated that it is not adverse to the proposed consolidations.

This leaves the holding of the foreclosure sale the only remaining obstacle in the way of bringing about the actual consolidation. As it will be necessary to advertise the foreclosure sale six weeks before it can be held it probably will be two months before the actual work of establishing one telephone service system can begin.

At the foreclosure sale the New York Telephone Company probably will bid in the York State property and at once proceed in the abandonment of the local York State exchange and the placing of the lines in the New York Telephone exchange.—Binghamton (N. Y.) Press, Sept. 17, 1915.

Automatic Telephone System Fights to Use City Conduits

John C. Sheehan, John M. Shaw and men affiliated with them in control of the Long Acre Electric Light & Power Company, and now in control of the Public Service Company, have under way proceedings to compel the use of public conduits for the Strowger Automatic Telephone.

The franchise under which the right is asserted is the same as that under which the Long Acre Company successfully fought for the use of the conduits of the Consolidated Telegraph & Electrical Subway Company, controlled by the New York Edison Company. The telephone company hopes to obtain use of the conduits of the Empire City Subway Company, which is controlled by the New York Telephone Company.

The Public Service Telephone Company has a capitalization of $10,000,000 stock, half common and half preferred, and $25,000,000 first mortgage 6 per cent bonds. Its officers are: President, John M. Shaw, who is also president of the Long Acre Company; vice-president, Albert J. Appell; treasurer, Alexander Davidson; secretary, John A. L. Campbell, formerly a city magistrate; directors, the foregoing and Clarence D. Simpson, George L. Graham, John C. Sheehan and Russell H. Robbins.

Samuel H. Wandell, who, with Stephen C. Baldwin and Martin Littleton, appears for the company, explained that the franchise under which the company makes its claims was granted in May, 1887, to the American Electric Manufacturing Company. It conferred permission to construct and use wires, conduits and conductors for electric purpose in the city.

Two years later the franchise was assigned to the late William H. Kelly, a former police magistrate, who left to Catholic institutions and Cardinal Farley $300,000 Long Acre bonds. These bonds were supposed by Charles F. Murphy and John O'Keefe, the executors, to be of no value, but eventually they were sold to representatives of the late Anthony N. Brady at par and compound interest. In 1909 the telephone privileges of the Long Acre Company were assigned to the Public Service Company, which was then incorporated in this state.

Last spring, Mr. Wandell said, the company served a demand for use of conduits on Walter Brown, secretary and treasurer of the Empire City Subway Company, offering $2,000 for a year's rental. The demand was refused. Mandamus proceedings are scheduled for argument before Justice Greenbaum in the Supreme Court early next month.

The Board of Estimate has declared the franchise void and the corporation counsel appeared as a party in the court proceedings.

Mr. Wandell said the company can start installing the system if it wins the suit. It plans, he said, not only to install the automatic system here but to connect with independent telephone companies all over the country. The system is in operation in Buffalo, Chicago, many cities of Ohio, Michigan and the Pacific Coast, and in Western Canada.—New York (N. Y.) World, Sept. 13, 1915.

OHIO

Prospect Telephone Company Asks Order

The Prospect Telephone Company of Prospect today asked the state public utilities commission to authorize it to purchase for $500 the Prospect property of the Central Union Telephone Company, according to an International News wire to the Star. Receivers for the latter company joined in the request. The commission also was asked to authorize an interchange of service.

The former company has 500 subscribers and the latter about ten.—Marion (Ohio) Star, Aug. 28, 1915.

Appraisal of Local Plant Is Now Complete

The men who have been engaged in making an appraisal of the property of the Lima Telephone Company, finished their work yesterday and departed from the city. This closes the first step in settling the controversy between the company and the council, and will have much weight in reaching a suitable rate which the company will charge its subscribers in this city.

The data which the appraisers took was sent to Columbus today. It will be immediately placed in the hands of clerks employed by the utilities commission and the total value of the material belonging to the company will be summarized. From this valuation the commission will set a certain rate schedule to which they think the company will be justly entitled.—Lima (Ohio) News, Sept. 5, 1915.

Telephone Question Up Again

Columbus, Ohio, September 7.—Before the State Public Utilities Commission on Friday of this week, Judge Allen Andrews, of Hamilton, will make an argument on behalf of the petition of the Hamilton Home Telephone Company. The prayer of the petition is that the Hamilton Home Telephone Company, an independent concern, may be attached to the Cincinnati and Suburban Bell Telephone Company. He claims authority is vested in the commission to order a physical connection and exchange of service between the two companies. The question in various forms has been raised before officials since the public utilities act was passed in 1911. Previous holdings have been unfavorable to the petition.—Cincinnati (Ohio) Enquirer, Sept. 8, 1915.

Telephone Deal Proposed

Columbus, Ohio, September 13.—The Williams County Telephone Company, whose headquarters are at Bryan, today applied to the Utilities Commission for authority to purchase the plant of the Edon Home Telephone Company for $12,500. —Cincinnati (Ohio) Enquirer, Sept. 14, 1915.

Telephone Dividend Declared

Directors of the Ohio State Telephone Company yesterday authorized the regular quarterly dividend of 1¾ per cent on the company's preferred stock, payable Oct. 1.—Columbus (Ohio) Journal, Sept. 15, 1915.

New Telephone System Nears Completion

Work is proceeding on the rebuilding of the entire system of the Ohio State Telephone Company in this city, preliminary to the installation of automatic 'phones. The entire plant will be rebuilt from the ground up, including a new building and all wires and connections. The magnitude of this task can be appreciated when it is known that a large force has been at work for several months. The frame for the automatic switchboard is in position, but the board has not arrived.

The management hopes to have the work completed early in November.—Youngstown (Ohio) Telegraph, Sept. 17, 1915.

ILLINOIS

Ohio State Telephone

L. P. H.—The Ohio State Telephone Company is a combination of independent companies. It was formed only last year with $5,206,000 of common stock, $4,974,000 7 per cent cumulative preferred, and $13,060,200 bonds, most of the bonds being issues of subsidiaries. The first year of operation closed June 30 last. Gross revenue was $2,879,353; operating expenses and taxes, $1,813,407; interest, $486,759; preferred dividend, $291,407; surplus, $287,837. The surplus amounted to 5½ per cent on common stock, but no distribution was made. The consolidation is new and its securities are not yet seasoned.—Chicago (Ill.) Tribune, Sept. 22, 1915.

OREGON

Interchange of Calls Between 'Phone Lines Is Desire of League

Salem, Ore., Sept. 11.—Charging that the present service of the Pacific Telephone & Telegraph Company and the Home Telephone & Telegraph Company is inadequate and discriminatory, the Public Service League of Portland, through its attorney, ex-Governor West, today filed with the public service commission a complaint, asking that a physical connection be ordered between the lines of the two companies so that calls orginating at stations of either line may be transferred to the other.

Connections between the switch boards of the two companies now exist in Portland hotels, it is alleged, but the companies have failed to extend this interchange of service to any other class of users, and this constitutes a discrimination. Approximately 40,000 stations form a part of the plant of the Pacific company in Portland and the Home company has about 14,000 stations, it is asserted. Of this number approximately 8,000 stations are alleged to be duplicates, and it is further alleged that there are about 32,000 of the stations that can only be reached over the Pacific company's lines, and about 6,000 stations that can be reached only over the Home Company's line. Failure of the companies to provide an interchange of service not only makes their service inadequate and discriminatory, but the system of rates unreasonable, it is alleged.—Portland (Ore.) Telegraph, Sept. 11, 1915.

PENNSYLVANIA

Telephone Girl Remains at Board During Fire

The bravery of a young girl employed as a telephone operator at the mill of the Philadelphia Paper Manufacturing Company, River road, near Nixon street, probably saved the structure from total destruction by fire.

When flames were seen in a pile of papers the employes fled to the street, but the operator remained at her post, despite dense clouds of smoke. She summoned fire engines in time to prevent serious damage. She refused to give the police her name.—Philadelphia (Pa.) Ledger, Aug. 27, 1915.

Operators' School Being Held in Butler Today

W. H. Hay, service engineer of the Western Pennsylvania Independent Telephone Association, is holding an operators' school in Butler for employes of the People's Telephone Company and adjacent employes.

Three sessions were held on Thursday with an attendance of eighty operators from Butler, Slippery Rock, Renfrew, Parker, Eau Claire, North Washington, Chicora, Bruin, Mars, Evans City and Zelienople. Three sessions will be held today, when a greater number of operators are expected.

The object of this school is to standardize the operating of all independent companies, especially in the long distance division. Mr. Hay is a very able instructor, having spent a great deal of time in studying this subject from every viewpoint.—Beaver (Pa.) Times, Sept. 10, 1915.

SOUTH DAKOTA

Webster

Webster, Aug. 19.—Special—The board of railroad commissioners has granted an increase in telephone rates after spending the past eight months in investigations. The increase amounts to 25 cents per month on all residence and business telephones, and an additional 25 cents per month for desk 'phones.—Aberdeen (S. D.) American, Aug. 20, 1915.

TENNESSEE

Secretary of State

Secretary of State R. R. Sneed has issued the following charters:

Speedwell Telephone & Telegraph Company, Claiborne county; capital, $1,000; incorporators: William Russell, William Ausmus, A. G. Beeler, D. Alexander and W. L. Sharp.—Nashville (Tenn.) Banner, Sept. 8, 1915.

Telephone Company Starts

Oakland, Tenn., Sept. 15.—The Oakland Telephone Company, Inc., with $1,000 capital, has begun business here. They will operate a local telephone exchange in connection with the long distance service. This company is owned and controlled by local people and its officers are the following well known gentlemen. T. M. Ross, president; P. D. Henry, secretary and treasurer. The following constitute the board of directors: T. M. Ross, P. D. Henry, Julian Tharp, A. A. Smith, Dr. E. P. Hopper.

This exchange will have direct free service with the exchanges at Macon and Williston and will cover about half the area of Fayette county. —Memphis (Tenn.) Commercial-Appeal, Sept. 16, 1915.

TEXAS

Advanced Ideas of Efficiency

Large employers of labor throughout the country are rapidly accepting and putting into practical use advanced ideas in the handling and care of employes. According to Dr. Martin E. Taber, medical director of the Southwestern Telephone Company, a healthy, satisfied employe, whether it be in a factory, shop or office, is a valuable asset and that managers of large industrial concerns, while slow in coming to a realization of this fact, are now making haste in their preparation to take the profits to be derived from improved working conditions.

Dr. Taber returned yesterday from a tour of inspection of Pacific Coast cities and Chicago and St. Louis. In various cities visited he made a study of methods and results of welfare work in large industrial institutions and paid special attention to the medical departments of these concerns. Yesterday he stated that he was more firmly convinced than ever that employers are finding that every dollar spent in providing for the safety, convenience, health and pleasure of the employed is a dollar invested. "I do not mean to convey the idea that profit is the sole motive of employers," said Dr. Taber, "for it is true that many men who have charge of large numbers of workers are doing all in their power to improve working conditions from purely a humanitarian standpoint, but in so doing they have cast their bread upon the waters, for they have found greater efficiency, individually and collectively, among their workers.

"The welfare work goes farther than giving medical attention and advice. Workers are instructed by means of lecturers, moving pictures and by demonstrations on matters of sanitation and care of health. By co-operating with the health departments many epidemics are broken up and undoubtedly many are prevented.

"To add to the pleasure of workers, gymnasiums are equipped for both men and women; tennis courts and play grounds established whenever possible, and by co-operation of employes each individual develops an interest in his fellow-workers and becomes more loyal to the institution which employs him. This is not a theory. It is being demonstrated in every large city by the Bell telephone people and by other large industrial concerns. I presume the Chicago Gas Company has carried the idea farther than any other institution in the country and greatly to its advantage. I am looking forward to the time when the movement will meet with more favor in our smaller cities."—Dallas (Tex.) Sept. 14, 1915.

VIRGINIA

Central Mutual Telephone Company, Inc., Manasses, Va. Maximum, $5,000; minimum, $500; par value, $10. Build and operate a telephone line. William M. Wheeler, president; Abraham Conner, secretary and treasurer, both of Manasses, Va.—Richmond (Va.) Virginian, Sept. 16, 1915.

Telephone System Brings $310

Fredericksburg, Va., Sept. 16.—The Orange & Fredericksburg Telephone Company, sold at auction in Orange, was purchased by R. L. Biscoe, of Fredericksburg, for $310. The line covers eighty miles of territory, has seventy-five 'phones in operation and extends from Fredericksburg to Orange along the track of Potomac, Fredericksburg & Piedmont Railroad, and from Orange to Locust Grove and Raccoon Ford in Orange.—Richmond (Va.) Dispatch, Sept. 17, 1915.

WASHINGTON

Order Refund of Telephone Deposits

Olympia, Aug. 21.—Approximately $100,000, representing annual deposits required of subscribers by telephone companies operating in Washington, will have to be refunded as a result of an order of the state public service commission. The order requires that all deposits received from subscribers be returned and orders that the $5 deposit be discontinued. In its stead, however, the order permits telephone companies to collect rentals for 'phones 10 days after becoming due, in default of which the service may be discontinued. Two months' rental may be collected in advance, furthermore.

Order Is Most Sweeping

The order is one of the most far-reaching ever promulgated by the public service commission affecting telephone companies, inasmuch as there have never been any provisions relating to collections in advance. The first rule, which prohibits the exaction of the $5 deposit, reads as follows:

"No cash deposit or other security for installation of instruments, for the payment of accounts for local exchange service or long distance service between points within the state or for any other purpose, shall be required of any telephone subscriber by any telephone company (other than a city or town) owning, operating or managing any telephone line or part of telephone line used in the conduct of the business of affording telephonic communication for hire within the state. Provided that deposit may be required for any local or long distance call originating at a pay station."

Allows 10 Days to Pay.

Rule No. 2, which relates to collections in advance, reads as follows:

"The company may disconnect any telephone, private exchange, or other instrument, device or apparatus of any subscriber and discontinue such subscriber's service on, or after the expiration of 10 days from the date on which any account for local exchange service or long distance service becomes due and payable (in advance or otherwise), when any such account remains unpaid after the expiration of 10 days from such date. Any telephone company may exact from any subscriber two months' rental in advance at the time of ordering service, such charge in no case to exceed $5.

"If the service charge ordered shall exceed $5 per month, the patrons shall pay from month to month in advance. If the service charge shall not exceed $5 the portion not absorbed in the first month's rental shall be applied on the succeeding month's rental and the patron shall thereafter pay from month to month in advance. No advance payment shall be exacted from the patron of the company on account of change of residence or telephone."

P. T. & T. Co. Must Refund $78,000.

There are 159 telephone companies operating in the state, and of these 12 require deposits from their patrons. These deposits have been drawing interest at 8 per cent, and have been forfeited by the subscriber if the phones are removed within one year. The Pacific Telephone and Telegraph Company has on hand approximately $58,000, representing deposits secured from its patrons in the state. The order, in addition to finally adopting the foregoing rules, requires all telephone companies to refund deposits heretofore made, within 20 days from the date the order becomes effective.—Spokane (Wash.), Review, Aug. 28, 1915.

New Rural Telephone Line

Des Moines, Aug. 25.—Incorporation papers have been filed for the Des Moines Rural Telephone Company, capitalized at $5,000. The county commissioners have been asked for a franchise to erect poles between Des Moines and the Pierce county line. Within two weeks lines will be run to Woodmont and Redondo and rural lines about Des Moines extended. Trustees of the company are W. D. McGee, Fred Russell, J. A. Rawls, F. W. Logan and J. C. Elsey.—Tacoma (Wash.), Ledger, Aug. 26, 1915.

Begs Relief From Telephone Troubles

Olympia, Sept. 9.—(Special.)—Mayor Israel Katz of Port Townsend has filed a complaint with the public service commission asking for physical connection between separate telephone companies doing business in Port Townsend. At the present time he says that subscribers of one company cannot communicate with subscribers of another line without being subscribers to both. The concerns are the Pacific Telephone & Telegraph Company, Northwestern Long Distance Company and the Citizens' Independent Telephone Company.—Tacoma (Wash.), Ledger, Sept. 10, 1915.

Salzer Telephone Company Formed

Centralia, Sept. 12.—(Special.)—Articles of incorporation have been filed with the Lewis county auditor by the Salzer Valley Telephone Company. The incorporators are J. W. Harvey, J. C. Lammers, G. W. Blair, Abe Crabbs and George Baschlin. The chief place of business of the company is at the Salzer Valley schoolhouse, east of this city.—Tacoma (Wash.), Ledger, Sept. 13, 1915.

Sues His Partner to Collect Money

An echo of the sale of the Home telephone interests of this section to the Bell interests was heard in the superior court today, where F. W. Buff has brought suit against John H. Davis to recover $3,287 on a telephone stock deal.

They entered a contract to buy a quantity of the stock of local companies, Buffs says in his complaint.

They sold a part of this stock to the Corporation Securities and Investment Company of Denver, he says. He declares that he believes Davies has sold a part of the balance, but that he refuses to give an accounting.—Spokane (Wash.), Chronicle, Sept. 15, 1915.

WISCONSIN

Rate Commission Allows Telephone Trust Free Hand to Hold Up People

For six years no action to relieve the people of Milwaukee and Wisconsin from the exactions of the telephone monopoly has been taken by the Wisconsin railroad commission.

The complete failure of "regulation" of public utility companies in Wisconsin is shown by the record in this case. The Wisconsin railroad commission, Aug. 8, 1909, declared in its ruling in the "Marinette case" that the items of 4½ per cent paid annually to the American Telegraph Company by the Wisconsin Telephone Company is "too high." Since that time payments of approximately $178,000 annually, amounting altogether to more than $1,000,000, have been made for this single item, this amount being contributed by telephone users in Wisconsin. Milwaukee's share of this extortion is $66,000 annually.—Milwaukee (Wis.), Leader, Sept. 11, 1915.

Depreciation Rate Is Too High Is Contended by Schoetz

Max Schoetz, assistant city attorney, who is representing the city in the telephone case before the Wisconsin railroad commission, has gathered statistical data from other cities and states. He said that in other parts of the country telephone companies are allowed from 4 to 6½ per cent for depreciation. He charges that the rate of 8 per cent in Wisconsin is too high. He said that in five years the Wisconsin Telephone Company has laid away a depreciation fund of $1,308,000.—Milwaukee (Wis.), News, Sept. 13, 1915.

Of Interest to the Trade

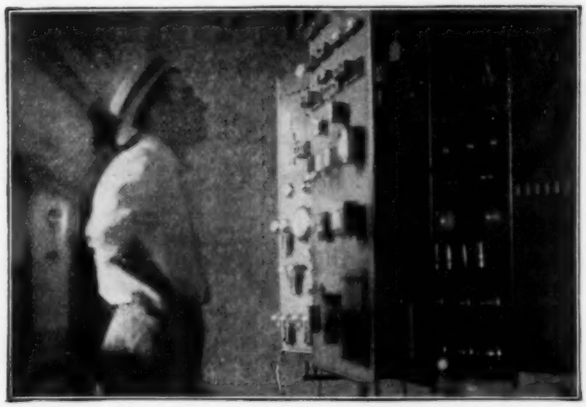
What the Telephone and Accessory Manufacturers Are Doing to Advance the Art

Kellogg at the Indiana Convention

"One of the best state convention sales records we have ever had," said B. H. Blake, of the Kellogg Switchboard & Supply Company, at the Claypool Hotel, Indianapolis, at the close of the state convention last Thursday evening.

Those in charge of the Kellogg display, "At the sign of the Desk Stand," were A. J. Carter, general sales manager; the two state representatives, B. H. Blake and John A. Campbell; C. D. Boyd, sales engineer, and Edward I. Pratt, who attended to the advertising features. In the center of the room was a large common battery section, which was made up especially to facilitate demonstrations of the Kellogg instantaneous recall switchboard, under convention room conditions. At the close of the two-day meeting, the peg count meters showed that the board had been busy every minute. This board, as originally placed on the market, and now installed in over thirty exchanges by the Kellogg Switchboard & Supply Company, is, the manufacturer claims, real efficiency in modern switchboard operation. The instantaneous recall was clearly explained in this demonstration, as well as the automatic peg count and secret service, and the many other time and money saving features.

A complete line of telephone equipment, both magneto and common battery was shown; while one of the centers of attraction, as at the last year's meetings, was the very complete set of Kellogg apparatus parts mounted on upright folding panels. This exhibit was probably the most complete collection of telephone apparatus parts ever assembled for display. These panels showed not only the completed separate pieces, but in-



Seeing How the Kellogg Apparatus Is Built.

Telephone Men Discussing the Kellogg Instantaneous Recall Switchboard.

General View of the Kellogg Exhibit at the Indianapolis Convention.

teresting special productions, illustrating, for instance, how the desk stand lugs and the transmitter backs and fronts and many other parts are produced from the flat metal. Lamp building was also shown, while relays, coils, condensers, generators and many other

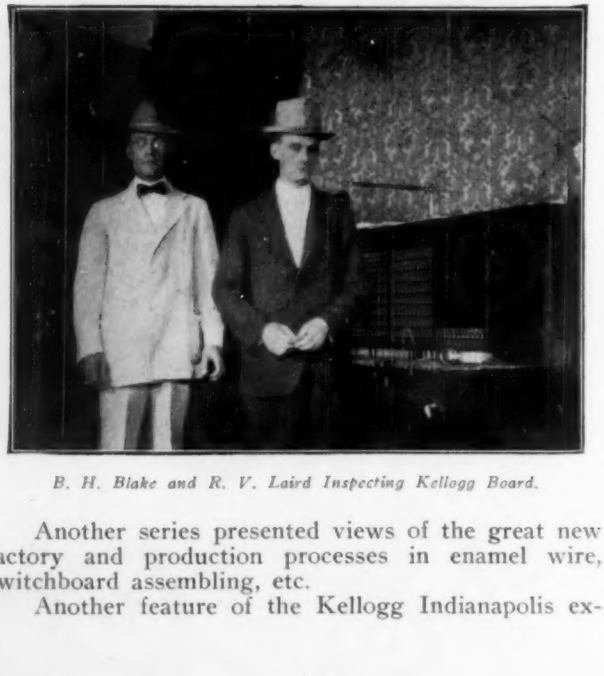
Demonstrating the Kellogg Magnet Board.

well known telephone equipment pieces were in different stages of construction.

A novelty in convention exhibits that created great interest was an advertising lantern slide projection which enabled the company to show customers and visitors just how the Kellogg slides appear on the screen. These slides of the Kellogg Company are having very wide distribution, for use by the operating companies in picture theaters.

Different series were shown featuring toll service value, extension set economy, intercommunicating and p. b. x. advantages, and slides of general subscriber-getting, or educational value. The company will send illustrated circulars of these slides on request.

This screen was also used to illustrate the Kellogg magneto and private branch exchange switchboards.



B. H. Blake and R. V. Laird Inspecting Kellogg Board.

Another series presented views of the great new factory and production processes in enamel wire, switchboard assembling, etc.

Another feature of the Kellogg Indianapolis exhibit was the striking series of folders distributed. One of these, perhaps the most unique piece of telephone literature ever produced, was an actual size reproduction of a telephone receiver, accurate in shape and appearance, that, on opening, proved to be an illustrated booklet describing Kellogg Bakelite insulating products.

This new and wonderful line, which we hope to illustrate and describe on these pages at a later date, includes not only regular receiver shells, but cases for operators' receivers, transmitter mouthpieces, and many other parts for telephone apparatus insulation.

Studying the Kellogg Key Shelf.

Then there was given out an unusual bulletin describing the Kellogg No. 97 desk stand and equipment. An attractive cover with beautiful color reproduction

Lantern Slide Used for Advertising.

of this telephone in colors, front and rear views, make this piece of literature sure to be opened and read.

A new booklet on the famous Kellogg reverse type transmitter was also distributed.

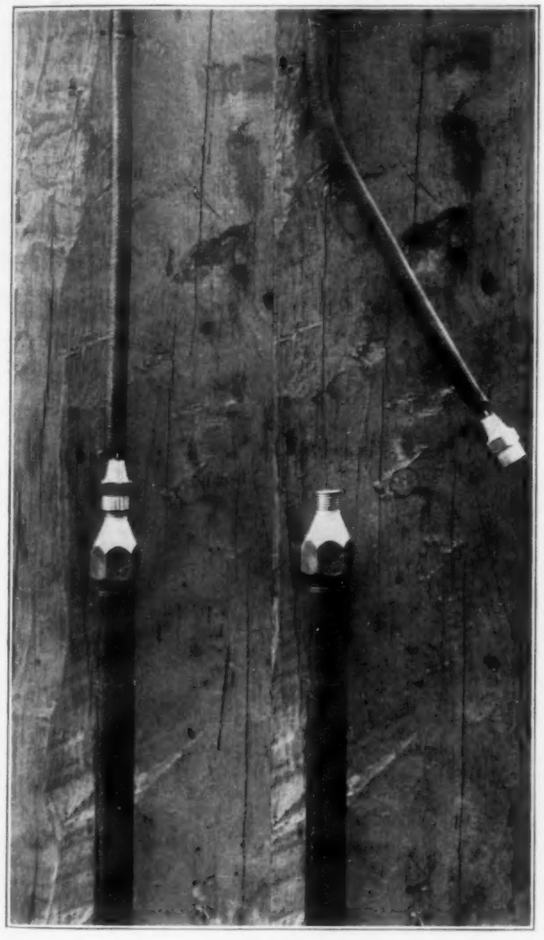
Ogden, Logan and Idaho Railway Telephones

The Ogden, Logan and Idaho Railway Company is going to modernize its train dispatching. An order has been placed with the Western Electric Company for one complete train dispatching system, including 30 way station equipments, dispatcher's outfit and attendant telephone sets and material. The railroad company feels that the new system will solve their dispatching problems and serve to increase their transportation facilities.

Fargo Grounding Devices

A ground device which was recently placed on the market embodies the valuable feature that the ground wire is always carried down to damp earth, insuring a positive contact. A test is made first to locate permanent damp earth and then the grounds are made to the proper length. Another feature of this grounding device is the ease with which it is disconnected from the ground for testing purpose. An accompanying illustration shows the grounding device connected for service and open for tests.

In this device no bolts or set screws are used, eliminating any chance of their being out of commission when there is an overload to be carried off from



Connected for Service. *Disconnected for Test.*

the lightning arrester. Connection is effected by compression which is sufficient to force the wires into each other, forming a cold weld. This feature has increased the carrying capacity of the connection, it is said, until it is several times greater than that of the conductor. It is stated that with the use of this connection as high as 30 per cent of the current has been saved. These connections have stood strain tests up to 40,000 pounds per square inch before the grip was broken.

The manufacturer of this grounding device, the Fargo Manufacturing Company, of Poughkeepsie, N. Y., has also developed grounding plates embodying the same feature of a positive contact to permanent damp earth. The joint between the ground wire and the connection device is of the conical compression principle, which was described in a recent issue of this publication.

These connection devices are made in several sizes of conductor and pipe to meet any conditions. The "A" connection is particularly desirable where periodic testing of grounds is necessary. A modified form, type "B," employs the twisted double wire compression principle. Both types eliminate the use of bolts and set screws.

One of the new features brought out in this grounding device is the eliminating of the loose contacts or loose parts, which make the poor grounds. The compression principle has just the right amount of compression to form a cold weld, which is the important feature of a ground, and which has been overlooked in the past. Every part is locked with a spring, so the alternating current has no effect on the joints or contacts.

A New Patent Climber

Much trouble has in the past been experienced by linemen in that the gaffs of their climbers either break out at the point they were welded onto the shank, or that the rivets used to hold the gaffs on work loose in time, causing a certain feeling of insecurity if not of danger.

The Oshkosh Manufacturing Company has devised and patented a method of manufacturing Roberts patent climbers, whereby the entire climber is made of one piece of steel. The gaff is one and the same piece of steel as the shank, and never leaves the shank

The Roberts Climber.

during manufacture. The steel used is genuine crucible, and each climber is subjected to some 250 blows of a hammer during manufacture, thereby working out every defect, such as sand holes or carbon spots. The finished climber is subjected to tests of five times the ordinary strain it will ever be put to before it leaves the factory.

The company guarantees every climber not only against the usual defects, but more important than all, that the gaff will never break out. That's a pretty strong guarantee, but several years' experience manufacturing these climbers has proven beyond a doubt that the company is entirely safe in making this guarantee.

As an added feature, these climbers are equipped

with a ring on the outer end and fitted with straps that eliminate the old half turn across the instep, the straps lying flat. This permits of tighter straps, which not only replaces with a feeling of confidence the old uncomfortable and insecure feeling, but makes for much speedier and surer work on the part of the lineman.

These climbers cost no more than any other high-grade climber, and are handled by all jobbers, and information can be had from them or direct from the company.

For the Manager in Doubt

Although the days of large multiple generator call switchboards have long passed, considerable numbers of this type of board ranging from three to six positions have been installed up to a comparatively recent date. At present the general sentiment among operating men favors common battery operation for new offices of sufficient size to immediately demand a multiple system. In a large number of offices serving from three hundred to five hundred lines, however, a very small percentage of the calls would require being answered in the multiple, if installed, and the expenditure necessary for a common battery multiple board seems hardly warranted. Boards of the transfer type, on the other hand, offer increasing operating difficulties as the system is extended. The Stromberg-Carlson Telephone Manufacturing Company has recently developed a design of generator call switchboard for use in offices of this size, which it believes will appeal to the live manager, both from an operating and financial standpoint.

The sections are of the unit type, each having a capacity of two hundred self-restoring drops, double drop supervision and a transfer space. The first position is used only for toll and rural lines, and connection can be made with over one-half of the regular subscribers' lines without resorting to transfer circuits. Transfers, moreover, are not required for inter-connecting as high as four hundred regular lines. The prime factor in the design of this style of section has been to bring the maximum number of drops within reach of each operator in order to decrease the percentage of trunked calls. This has been partly accomplished by omitting the usual woodwork between the front equipment of adjacent positions, and so constructing the unit sections as to prevent a continuous face. The elimination of the wooden stiles is also said to have a beneficial effect on the service by removing what many operators regard as the specific limit beyond which they are not expected to answer calls.

When so ordered, this type of cabinet may be supplied with a slightly modified jack frame arranged for mounting future multiple jacks above the line signals, but equipped with transfer circuits for present use between the extreme positions. At a time demanded by the rising percentage of trunked calls, the whole board may then be easily converted to a magneto multiple. The cost incident to multiple conversion is accordingly borne only when actually required, and without discarding any apparatus other than the transfer jacks and plugs.

Information concerning the various types of switchboards suitable for offices of this size will be gladly furnished upon application to the Stromberg-Carlson Telephone Manufacturing Company, Rochester, New York.

Telephone Equipment for Churches

A new type of telephone apparatus, known as "church telephone equipment," has made its appearance on the market. It will be most useful in churches, lecture halls, and theaters where the acoustic properties are poor, or where there is among the audience men and women whose hearing is not normal.

The equipment, which has been developed by the Western Electric Company, consists of a special telephone transmitter for mounting on the pulpit or platform, and receivers to be used by those in the audience requiring them. The transmitter consists of three special microphone transmitter units in an ebony finished case. The receiver is the ordinary watch case type, with a lorgnette handle, provided with a special sliding extension to vary its length from four to seven inches. This receiver is convenient to use; it may be held to the ear for any length of time without fatigue.

Each receiver is provided with a cord and plug. A jack, which is connected to the line leading to the transmitter, is placed in the pews. When the plug attached to the receiver is inserted in the jack the user is in a position to listen via telephone to everything that transpires on the pulpit or stage, no matter where he or she may be sitting.

Although the apparatus has been designated "church telephone equipment," it can be used equally well in theater or lecture hall. There is no doubt that the system will prove a boon to the church-goer whose hearing is defective or whose pew is in a far corner of an edifice with poor acoustic properties.

Railroads Increase Dispatching Facilities

The Illinois Central and Atlanta and West Point Railroads are planning to add additional equipment to their train dispatching facilities. The plans of the Illinois Central call for ten complete stations which will be cut in, in addition to the fifty which they have had in service since January.

The plans of the Atlanta and West Point Railroad call for 13 complete stations, which will be added to the 30 the company has had in operation since early fall. The equipment in both cases will be furnished by the Western Electric Company.

New Portland Quarters for Western Electric

Expansive business growth has caused the Western Electric Company to give up its old quarters at Portland, Oregon. Since 1910 the company has been located on Fifth street, but has now moved into a new two-story brick and concrete building which has been made ready for them at East Ash and Union streets. The building, with efficiently designed shipping, receiving and warehousing facilities, is one of the most modern of its kind in the Northwest. It has been planned to facilitate the quick handling of large stocks, which will insure first-class service.

Weston's New Line

The Weston Electrical Instrument Company is bringing out a new line of alternating current instruments, whose perfection is announced as a distinct advance in the science of electrical measurement. These instruments will be described and illustrated in November Telephone Engineer.

Brevities of the Business

The Activities of the Whole Telephone Field Told in Short Paragraphs

PERSONAL NOTES.

A. E. Huntley, manager of the Michigan State Telephone Company exchanges in St. Joseph and Benton Harbor for the past four years, has been made district manager of the Petoskey district.

W. R. Johnson has resigned his position as district commercial manager of the Lincoln Telephone Company at Hastings and the South Platte section of Nebraska.

Bernard Hull, who has acted in the capacity of collector for the Wisconsin Telephone Company at Ashland, has been made local commercial agent.

After a lingering illness, Charles Vaughn died at his home in Wisdom, Montana. Mr. Vaughn was prominently identified with telephone interests on the Pacific Coast, but late years has been manager of the Southern Montana Telephone Company at Wisdom.

P. T. Mitchell of Charlotte has accepted the position of manager for the Michigan State Telephone Company at Eaton Rapids, succeeding H. L. Norton, resigned.

W. H. Dean, traffic supervisor of Harrisburg for the Bell Telephone Company of Pennsylvania has been transferred to Philadelphia and will become division supervisor. C. P. Williams, traffic supervisor of the Scranton district, succeeds Mr. Dean.

C. J. Queen, of Columbus, is the new general manager of the Ohio State Telephone Company at Akron, successor to the Akron Peoples Telephone Company.

W. H. Swinda has resigned his position as president of the Elnora Co-operative Telephone Company at Elnora, Indiana, and Dan Courtney was elected to fill the vacancy.

H. A. White, who has been district traffic chief of the Pacific States Telephone & Telegraph Company in Fresno, California, during the last three years, has been promoted to fill a similar position in Oakland. Mr. Sherman will succeed Mr. White.

George K. Blakely, district manager of the Northwestern Telephone Company in Sioux Falls, South Dakota, has resigned and will be associated with the Fish Bake Oven Manufacturing Company of Walworth, Wisconsin, with headquarters in Chicago. Mr. Blakely has been district manager for six years and fifteen years in the service of the company. He will be succeeded by Thomas Phalen of Wilmar, Minnesota.

For ten years manager of the Jackson exchange of the Michigan State Telephone Company, Walter L. Stevens has been made the successor of A. E. Huntley, managing St. Joseph and Benton Harbor.

H. W. Linaburry, plant chief for the Bell Telephone Company at Rock Island, Illinois, departed for South America in the interests of his company. Mr. Linaburry expects to be absent a number of years.

NOTES FROM THE FIELD

ARKANSAS.

The Southwestern Telegraph and Telephone Company of Bentonville recently paid to City Treasurer Elliott R. Berry $136.25, the annual tax of twenty-five cents on each telephone pole in the city limits.

FLORIDA.

The lines of the Sorrento Telephone Company of Sorrento are being thoroughly overhauled. Longer poles are being put up, and a new central will be installed. Eventually the double wire system will be put in, and various other improvements will be added.

IDAHO.

The Mountain States Telephone and Telegraph Company is busily engaged removing the telephone poles from Shoshone street, Twin Falls, and resetting them in the alleys.

ILLINOIS.

What will be one of the largest telephone exchanges in the world is now being completed by the Chicago Telephone Company at 6041 Kenwood avenue, Chicago. It will take the place of the present Hyde Park exchange at 5723 Dorchester avenue. The original equipment will be adequate to serve more than 25,000 telephones.

August 30 the Chicago Telephone Company paid the city $236,630, representing three per cent of gross earnings for six months ending June 30.

Olivet Telephone Company, Olivet; capital $1,000. Incorporators, H. S. Hester, W. W. Cannon, Daisy Hester.

Subject to the approval and consent of the public utilities commission, the Clayton Exchange and Siloam Springs Telephone Companies, competing companies in Clayton, will merge. The Clayton exchange, the larger of the two, will purchase the holdings of the Siloam company. The companies will become one as soon as the proper action is taken by the public utilities commission.

Stock of the Kellogg Switchboard and Supply Company has advanced 25 points in the last month to 350. Reports current are that the concern has large and remunerative war contracts.

IOWA.

At the annual meeting of the Interstate Telephone Company, of Dubuque, held at the Wales hotel September 8, all the old officers were re-elected, as follows: George Kriebs, president, Elkport; George Denkhoff, secretary, Dyersville; C. M. Laxson, treasurer, Earlville, and G. W. Flaming, Edgewood; J. M. Dunn, Earlville, and Archie Frater, Dubuque, directors.

The Bell Telephone Company has started the building of a new line between Ida Grove and Lake View.

H. B. Shumacher, president, of Toledo, J. M. Plaister, secretary, of Ft. Dodge, and Charles E. Deering, of Des Moines, member of executive committee, held a meeting in Rockwell City with P. C. Holdoegel, member of the executive committee, to plan for a series of operating schools to be held in different parts of the state. These men are the officers of the Independent Telephone Association of the state.

A new telephone exchange costing $1,700 will be erected at Coin.

The central plant of the Bell Telephone Company, at the corner of south Main street and First avenue, Council Bluffs, was damaged by fire of incendiary origin.

KANSAS.

W. F. Sloan, of the telephone engineering firm of Sloan, Huddell, Fuerstell & Freeman, of Madison, Wisconsin, will spend two months at Leavenworth taking a physical valuation of the People's Home Telephone system, according to L. R. Parker, of Aurora, Ill., controlling director of the company.

The Kansas Telephone Company is installing new switchboards in their exchange on west Third street, Ottawa.

MICHIGAN.

The Citizens' telephone exchange at Cadillac was destroyed by fire September 6.

Work has been started by the Michigan State Telephone Company to install an exchange at Bark river to serve the residents of the village and the farmers of a wide surrounding territory.

The annual meeting of the Michigan Independent Telephone and Traffic Association was held in the office of the company in the Shepard building, Grand Rapids. The company is the clearing house for the independent long-distance business in Michigan, Ohio and Indiana. The meeting was attended by J. C. Bousch, of Columbus, general manager for the company in Ohio. The following officers were elected: President, C. E. Tarte, Grand Rapids; vice-president, W. J. Melchers, Owosso; secretary-treasurer, F. V. Newman, Grand Rapids; new directors, George L. Hall, Dowagiac, and J. H. McMillan, Bay City.

Much progress is being made in the work of removing the telephone poles from Lansing's streets.

Michigan State Telephone Company, usual $150 per share on preferred, payable Sept. 30 to stock of record Sept. 18.

Appraisal and investigation of the financial arrangements of the Detroit properties of the Michigan State Telephone Company will take about five months, according to a rough estimate made by Edward P. Burch, engineer in charge.

Approximately $10,000 will be spent by the Michigan State Telephone Company on its lines between Turner, Emery Junction and Tawas City. A copper circuit and a phantom circuit will be provided between Turner and East Tawas. Nine miles of existing line between Emery Junction and Tawas City will be re-routed. The work will be started in the near future.

The directors of the Citizens' Telephone Company, of Grand Rapids, organized September 16 by re-electing president Charles F. Young; vice-president, Robert D. Graham; secretary, A. E. Wells, and general manager, Charles E. Tarte. John D. Martin was elected treasurer to succeed Judge William J. Stuart, deceased.

The Michigan State Telephone Company's exchanges at Coloma and Watervliet will be improved.

MINNESOTA.

Automatic telephone service for St. Paul was brought a step nearer when the work of equipping the downtown exchange of the Tri-State Telephone Company, at Eighth and Cedar streets, was started.

By permission of the state railroad and warehouse commission the Northwestern Telephone Company will give Brainerd a new rate for phone service, effective September 1. The new schedule will place Brainerd on about the same rate basis as has been operative in Little Falls for some time past.

MISSOURI.

Work has been started on the Tarkio Bell telephone plant, which is to be rebuilt. New exchange boards will be installed and the entire system rewired. The work will cost about $20,000.

MONTANA.

A new telephone in Meagher and Musselshell counties is proposed by the Central Montana Telephone Company, who have filed articles of incorporation. The line is to run from Hedgeville, in Meagher county, to Ryegate, in Musselshell county, and the company proposes also to build branch lines as needed, terminating in Winnecock and other towns. The capital stock is $25,000, all of which is subscribed, Alfred Bouchard, of Berclair, holding $24,750, and the balance is held by F. S. Platt, of Iren, and W. E. Jones, of Harlowtown.

Brady is to have a complete telephone exchange. The plant will be installed during the next month.

A new telephone line has been installed on the Beartooth national forest.

NEW YORK.

The New York Telephone Company is said to be buyer of the five old dwellings at 208 to 216 East Seventy-ninth street, New York, reported sold for various owners a short time ago by the Ruland & Whiting Company. These properties were taken for the purpose of the erection of a new central office to relieve the pressure of business now being done by the Columbus, Riverside, Schuyler, Murray Hill and Bryant Central offices. The site, which measures 100x102 feet, is to be improved immediately with a typical telephone building, plans for which are now being prepared by McKenzie, Voorhees & Gmelin.

NORTH DAKOTA.

A crew of men are rebuilding the Northwestern telephone line between Fargo and Bismarck.

The Farmers' telephone line, from New Leipzig to Willa, is now under construction. It is expected to complete about 20 miles of the line this fall.

OHIO.

Cincinnati Suburban Bell Telephone Company, 2½ per cent on capital stock, payable October 1. Books close September 23, reopen September 30.

The Ohio State Telephone Company, of Canton, changed the name of Stark to State, as much confusion has resulted from the two names since the Ohio company has taken over the Stark Telephone Company.

September 14 directors of the Ohio State Telephone Company authorized the regular quarterly dividend of 1¾ per cent on the company's preferred stock, payable October 1.

PORTO RICO.

The Porto Rico General Telephone Company of San Juan, Porto Rico, and of Stamford, has filed recently a final certificate of dissolution in the office of the state secretary. All claims against the company have been paid. The certificate is signed by directors S. Behn, P. I. de la Riviere, Earl K. Burbon, J. Canizal and Paul Ludke.

SOUTH DAKOTA.

A transaction has been completed at Lake Andes by which the telephone property formerly owned and operated by C. M. Lokken has been acquired by the Dakota Central Telephone Company. The transaction combines the local exchange and rural lines operating from Lake Andes.

The Dakota-Montana Telephone Company has installed a new switchboard at Lemmon with a total capacity for handling 440 local phones and 20 toll lines.

Breckenridge, S. D., Dec. 16.—Special: At the meeting of the Bison Telephone Company at Breckenridge September 14, the decision was made to put in a new twenty drop switchboard in the central exchange of the company at Bison. This will enable the patrons of this line to connect with the other towns in this vicinity as well as with the Lemmon exchange.

TENNESSEE.

Plans are being made by the Illinois Central Railroad to construct a new telephone system from grand central station to the south yard shops and to Noconnah to give direct connection with every company department in Memphis. The new system will cost $18,000 and will be completed within sixty or ninety days.

Speedwell Telephone and Telegraph Company, Speedwell; capital stock, $1,000. Incorporators, Wm. Russell, Wm. Ausmus, A. G. Beeler, Dorsey Alexander, W. L. Sharp. To build and operate a telephone line from Speedwell to Cumberland Gap and Tazewell.

The Cumberland Telephone and Telegraph Company has announced that it will reconstruct practically the entire telephone system of Lenoir City. The old open wires and small cables will be replaced by large cables wherever possible. The arrangement of open wires where there is not a sufficient number to warrant a cable, will be made more efficient.

TEXAS.

At a meeting of the Texarkana Telephone Company, held at Texarkana a short time ago, the resignations of John J. Lenz, president; A. C. Stuart, vice-president and manager; James F. Rochelle, secretary, and all other officials of the company, were presented and accepted by the board. A reorganization was then effected with A. C. Stuart, of Texarkana, president and general manager; S. C. Poage, Little Rock, vice-president, and J. H. Beall, Texarkana, secretary-treasurer. A new board of seven directors, nearly all Texarkana men, also was elected. One of the new directors is J. E. Farnsworth, of Dallas. The Texarkana Telephone Company a few months ago purchased the local holdings of the Southwestern (Bell) Company and consolidated the two systems. It is announced that as a result of the recent reorganization the properties of the company will be greatly improved and lines extended so as to give services to all surrounding rural territory.

The Texas Telephone Company of Waco has purchased the telephone exchanges of the Southwestern Telegraph and Telephone Company of Moody and Walnut Springs.

UTAH.

Excavating work for the new conduit system of the Mountain State Telephone and Telegraph Company of Ogden is rapidly progressing.

WISCONSIN.

A school of instruction for operators in La Crosse and vicinity was held at the Stoddard Hotel, March 17 and 18, under the instruction of W. S. Vivian of Chicago.

Plans for the construction of a telephone exchange to be known as the Mitchell office building for the Wisconsin Telephone Company at Milwaukee are in the hands of Architect A. C. Eschweiler, who is taking figures for the work. The building will be on Seventeenth avenue and Lapham street. It will be of reinforced concrete construction, fireproof, three stories and basement, 68 by 60 feet.

The annual meeting of the Red River Telephone Company was held January 4 at Shawano. J. T. Callahan and Aug. Zarling were elected directors and the old officers were re-elected.

The annual meeting of the stockholders of the Badger Mutual Telephone Company of Webster was held January 7 and the following officers were elected for the year: President, Andrew Melland; vice-president, L. L. Croissant; sectary-treasurer, L. R. Roberts. Various improvements are being planned for the coming year.

The Theresa Union Telephone Company was recently ordered to improve its service between Theresa and Lomira before May 1, 1915.

W. R. Johnson and Emmet Curran of Wausau have purchased the Elderon Telephone Company. The line is a long distance one between Wausau and Elderon.

The Wisconsin Telephone Company is preparing to construct a telephone line to the townsite of Oliver, on the St. Louis river.

The Reedsburg Telephone Company have sold their business here to L. J. Roberts, of Bangor, who has taken possession. Mr. Quale, the present manager, will be retained.